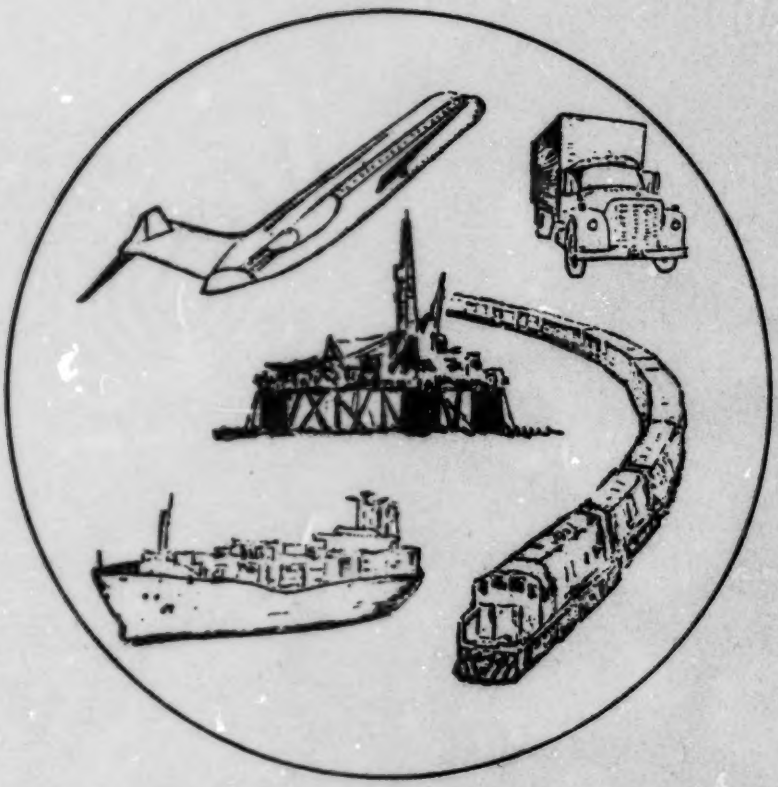
ENERGY UPDATE

1995



Voluntary Planning

Nova Scotia

November 1983

ENERGY UPDATE

1995

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PREFACE

In late 1978, Voluntary Planning published as "Energy Outlook - 1990," an examination of our energy future which attempted to set the stage for open discussion of the options available to Nova Scotia in attempting to meet its energy demand. While the energy scene has changed dramatically since that study, leaving only some of the basic assumptions effective such as "That the supply of oil is vital to the Nova Scotia position," the recommendations and conclusions are still valid.

The publication of an "Energy Plan for Nova Scotia" by the Department of Mines and Energy in late 1979 provided additional valuable information on the coal resources in the province (see Appendix F for a review of the Energy Plan). The release of the National Energy Program, October 1980 and the National Energy Program Update, June 1982 provided new data on the natural gas resources that could be made available in Nova Scotia. The "Fundy Tidal Update -82" study and the tidal power demonstration plant at Annapolis Royal are both expected to assist in the commercial development of a major tidal project for the export and regional use of electrical energy.

In spite of the large amount of information available, energy price levels and development costs have been changing dramatically, making meaningful analysis very difficult. The Committee had hoped to provide projections of future energy requirements, availability and costs of major energy options, however, rapidly changing conditions made this impractical. This report should be considered to be a background paper updating some of the material in the original report, although new specific concerns have been identified, some new conclusions have been reached and recommendations have been made.

SUMMARY

Overview

World Situation

Following the original report "Energy Outlook - 1990," completed in late 1978, the OPEC countries again took a firm hold on the distribution of oil in the Western World further increasing prices. However, subsequently reduced demand and increased oil production from other sources weakened their position. Political disturbances in the Middle East are continuing, oil prices have declined and future oil pricing remains uncertain.

Conservation practices and replacement by alternatives as well as a virtual halt in economic growth, have reduced oil consumption levels.

The large excess of OPEC capacity, together with increased production by non-OPEC producers, could mean that over the future period, through 1995, average crude price increases may not be out of line with the overall inflation rate. Such price increases will be substantially below those previously forecasted in the earlier report.

There are many consequences of a slower increase in oil prices, however, some of them do not necessarily promote long-term energy availability. Synthetic fuel projects become more difficult to justify, the rate of conservation slows, and the profitability is reduced of such major high cost projects as Hibernia, Venture and the Arctic Pilot Project.

Meeting the demands for energy is made more complex and more costly by the growing knowledge and concern over the effects on the environment of present methods of exploiting, transporting and utilizing energy sources, both renewable and non-renewable.

The Canadian Energy Situation

Although Canada has reduced its annual growth rate in the use of energy over the past several years, it should be noted that as a whole we still consume the most energy of any nation in the world on a per capita basis.

Compared with many industrialized countries, Canada is fortunate since we possess considerable domestic supplies of energy. However, distribution problems create energy insecurity which is borne by the population of eastern Canada with their limited access to the Western Canadian oil and gas resource base and who must rely on the importation of oil from foreign sources. At the same time, since the Canadian price of oil is currently less than the international price, the oil producing provinces are in effect, subsidizing the price of oil in eastern Canada. This situation arises from federal government policies which hold Canadian prices below international levels.

Canadian oil production is in a steady decline and in spite of the National Energy Program we cannot be self-sufficient in crude oil until the 1990's. The Program recognized that unless drastic steps were taken, the quantity of oil imported will continue to rise to make up the deficit. In addition to all possible actions needed to increase the domestic supply of oil, its replacement by alternate energy sources must be undertaken with vigor. Interfuel substitution, for example replacing oil with gas where economic, is a practical method of reducing dependence on foreign oil.

It is of some comfort to note that our annual gas reserve additions continue to be much greater than our annual consumption and that Canada's proven and probable reserves will enable us to be self-sufficient in this source of energy until well into the next century, even with the recently approved substantial increases in export sales.

Nova Scotia Energy Situation

Provincial Government policy is centered on attempts to reduce oil consumption in electrical generation by producing and utilizing indigenous coal resources of Nova Scotia and by improving conservation methods. Although electrical generation offers an obvious potential for using coal, it must be realized that it is not the largest user of oil. In 1981 transportation was responsible for 42 percent of all the

oil consumed in Nova Scotia while industrial, commercial and residential users together were responsible for 39 percent, leaving only 19 percent used for electrical generation. This represents a major reduction from the 29 percent used for electrical power generation in 1975. The increased use of coal has substantially reduced the use of imported oil in electric power generation as shown in Appendix C.

As other energy sources such as natural gas become available, they should be considered for industrial, commercial and residential applications. Propane and compressed natural gas (CNG) may also become more attractive as fuel alternatives for motor vehicles.

It appears that tidal power may be able to make a real contribution to the electrical needs of the eastern North American continent by the end of the century. The study "Tidal Power Update - 82" and the pilot project at Annapolis will contribute to the development of this resource.

The possibility that the end is in sight of the dependence of Nova Scotia on insecure supplies of imported oil is ever more probable. Now that the questions concerning the control of the offshore resource have been settled by Government of Canada/Nova Scotia Agreement, exploration activity on the Scotian Shelf is taking place at an increasing rate. Further, the confirmation that commercial quantities of gas are present in the Venture structure will likely result in the supply of Nova Scotia gas in lieu of western gas to eastern Canada and United States markets. Chances are growing that we will not only reduce our dependence on imported oil, but that the increasing activity taking place offshore Nova Scotia will result in oil being found in addition to the gas already confirmed. Future oil supplies from Hibernia, the Beaufort Sea and offshore Nova Scotia may eliminate the need for imports from foreign countries.

The commercial find of gas and gaseous liquids in the Venture field announced by Mobil will require extensive planning if the province is to realize the social and industrial benefits that such development could bring. It will be necessary to protect other sectors of the economy such as fisheries and tourism from potentially harmful effects of such development and to minimize adverse effects such as inflation and changes to life styles which have been experienced by other areas in the wake of

commercial oil and gas discoveries. Similarly, the exploitation of new sources of energy will require that timely planning takes place.

Voluntary Planning in its earlier report recommended that as a first priority, every effort be made to establish a working regional energy corporation and a strong regional electrical grid. Such a corporation would have:

a. made available several electrical generation options in addition to those now economically viable;
b. resulted in lower capital and generating costs due to economies of scale; and
c. resulted in the ability to raise capital at lower interest costs.

The setting aside of the Maritime Energy Corporation (MEC) concept is inconsistent with the previous recommendation which is still strongly supported. Operating within a stronger regional corporation, Nova Scotia could take part in developing a regional power grid and gain advantage from major electrical generating projects utilizing indigenous coal, tidal power of the Bay of Fundy, nuclear plants in New Brunswick and hydro sources in Newfoundland and Quebec.

Conclusions

Consideration of the report leads to the following conclusions.

Conservation

a. An economic pursuit of conservation is the cleanest and least costly way to reduce dependence on imported oil.
b. Government programs which have been designed to encourage the conservation of energy in existing building and industries do not appear to have been effectively extended to new construction.
c. The existing property tax system (which is based on fair market value) does not serve as an incentive to improve the energy efficiency of new and existing buildings.
d. In spite of the leadership shown by the Department of Mines and Energy in initiating programs to promote conservation and the use of renewable

energy, some examples have been presented which indicate that in-house conservation is not being practiced by all government departments.

Electrical Generation

a. A regional approach to generation and transmission will achieve the highest efficiency and lowest long term cost in the supply of electrical energy and the Voluntary Planning Board believes this to be essential.

b. The decision made by the Province to embark on a maximum coal option for the generation of electrical energy is not widely supported by most Sectors of Voluntary Planning. This lack of support stems from the high priority attached to a secure supply of energy at the lowest possible cost. No hard evidence has been provided to show that Nova Scotia coal meets this test.

c. The nuclear alternative has not been sufficiently addressed publicly as an energy source by the Nova Scotia government and many of its aspects such as economic, social and environmental have not been explored.

Energy Resources

Coal

a. There is sufficient coal from Nova Scotia sources to meet the forecasted requirements of the Nova Scotia Power Corporation, the Sydney Steel Corporation, other domestic customers and an export market.

b. The decisions by the Nova Scotia Power Corporation to substitute coal for oil in new generating plants appears to be economically sound, however conversion of existing oil-fired plants to coal is unlikely to be economically viable.

c. Information which demonstrates that Nova Scotia coal can compete profitably in international markets is not available.

d. Although there may be a very good possibility that the forecasted expansion of Cape Breton Development Corporation mines can take place on an economically sound basis, sufficient information is not available to allow the Board to comment on such expansion.

e. The Committee endorses continued research into:

(1) other uses of coal as an eventual alternative to oil (synfuels and feedstocks);

(2) other methods of coal combustion (fluidized bed combustion, coal-oil-water mixtures).

Gas

a. Although the domestic demand for natural gas is increasing at an average annual rate of increase of over 3 percent, Canadian gas reserves in only the Western Sedimentary Basin will continue to expand and provide sufficient deliverability to serve these markets through to 1997.

b. The Venture project is scheduled to commence supplying the Maritimes and export markets with natural gas in late 1987.

c. Offshore natural gas could displace significant quantities of imported oil in such applications as residential and commercial space and water heating, industrial processes and electrical generation.

River Hydro

a. Further development of river hydro plants will depend on future costs of fossil fuels and in any case will not add significantly to Nova Scotia's energy supplies.

Tidal Hydro

a. The costs of re-timing through storage a large-scale power development in the Bay of Fundy would make it uneconomic.

b. Nova Scotia, or indeed the Maritime provinces, could not absorb the peak power as generated.

c. A large guaranteed market will be required to render the project economically viable.

d. The unfavourable environmental impact is likely to be less than that contributed by other forms of power generation.

Forestry Derived Biomass

a. The forest industry of Nova Scotia cannot contribute significantly to the further generation of energy since softwoods are now being harvested in excess of their sustainable yield and hardwoods at two thirds of their allowable cut.

Individual Sectors of Voluntary Planning, in examining energy issues as they affected their specific areas of interests, arrived at the following conclusions:

Agriculture

a. The stated aim of the Federal Government to reduce the supply of heavy fuel oils, and the non-availability of natural gas to the majority of farms will result in an increased use of electricity in the absence of other alternatives.

b. In view of the absence of other alternatives to the increased use of electricity, the possibilities of the use of biomass and methane on the farm require serious study and the provision of financial incentives to encourage conversion.

Fisheries

a. Rising fuel oil prices have had a major impact on the profit margin for vessel operations, which has placed them in an uncompetitive position with respect to those countries such as France and Norway, which subsidize the fuel costs of their fishing fleets.

b. Fish processors, dependent upon electricity for the extensive cold storage facilities required, must have a secure source of energy at a cost competitive with other jurisdictions.

Forestry

a. Forestry in Nova Scotia cannot contribute significantly to the further generation of energy without increased silvicultural input, since hardwood is now at approximately two thirds of its allowable cut, and fuel wood consumption is increasing dramatically.

b. The 10 percent cost advantage of gas over oil as detailed in the National Energy Program will be insufficient to justify conversion.

c. The use of electricity within the sector will increase in response to higher oil costs.

Manufacturing

a. The priority concern of manufacturers is a secure supply of energy at the lowest possible cost.

b. The sector unanimously supports purchasing power if it is cheaper than can be generated within the Province.

c. The supply of natural gas by the earliest possible date is strongly supported both for reasons of security and in view of its lower guaranteed price with respect to oil.

d. The sector strongly supports the formation of a corporation which would carry out regional planning of the generation and transmission of electrical power within the Maritime Provinces, to achieve the highest efficiency and lowest cost possible in the supply of electrical energy.

Tourism

a. The conversion of buses to fuels other than gasoline or diesel should be encouraged.

b. The continuation of a lower than world price for Canadian fuels will give Nova Scotia tourist operators a major advantage over European tour operations.

c. The support of coal as a source of energy is based on it being used in an environmentally acceptable manner.

Recommendations

Based on the report and resulting conclusions, the following actions are recommended.

Conservation

a. As well as proclaiming the National Building Code, the Province should give encouragement to the use of materials clearly identified as being utilized to improve the energy efficiency of buildings.

b. Changes made to improve the energy efficiency of new or existing buildings should not add to the value of these buildings for property tax purposes for a predetermined period.

c. A simple method should be developed by government, and widely disseminated, for estimating cost-benefit analysis of conservation methods.

d. The possible use of biomass and methane, particularly in agriculture, deserves further serious study by the provincial government.

Electrical Generation

a. The Provincial Government should consider the formation of an Energy Corporation which would carry out regional planning of the generation and transmission of electrical power within the Maritime Provinces to achieve the highest efficiency and lowest possible cost in the supply of electrical energy.

b. No further thermal generating plants should be constructed after Lingan 4 is completed until such time as it can be demonstrated that all alternatives (including nuclear) have been examined and the one chosen is in the best interests of the Nova Scotia consumer.

Energy Resources

a. Existing oil-fired thermal generating plants should not be converted to coal until it is justified by a cost-benefit analysis of all alternate fuel sources, that it is of benefit to the consumer to do so.

b. The forecast expansion of CBDC mines should only take place if it can be proven that they can proceed on an economically sound basis. This justification should include an analysis of the domestic and international markets to be served.

c. Continued research should be supported for:

(1) other uses of coal as an eventual alternative to oil, e.g. synfuels and feedstocks; and

(2) other methods of coal combustion, e.g. fluidized bed combustion, coal-oil-water mixtures.

d. Any natural gas pipeline planned for gas transmission within Nova Scotia should be extended to serve Liverpool on the South Shore and Bridgetown in the Valley if these extensions can be demonstrated to be economic.

e. Additional river hydro plants should be constructed as they become economically viable.

f. The additional use of wood as an alternative source of energy should not be promoted in view of its limited availability.

Transportation

a. The Department of Municipal Affairs should initiate a:

(1) detailed cost-benefit analysis of providing rural bus services in various localities; and

(2) the possibility of utilizing school buses for early morning and late evening transport of rural workers should be examined.

b. In light of future availability of propane from indigenous sources, a study should be initiated by the Department of Transportation to examine the incentives necessary to promote its use for transportation purposes.

1. CHANGES IN THE WORLD ENERGY SITUATION

In the time that has elapsed since Voluntary Planning's initial study, "Energy Outlook - 1990" was completed in late 1978, it has become even more evident that the world energy situation is significantly influenced by availability and price.

OPEC countries have taken a firmer hold on the physical distribution of oil to the point that the seven major international oil companies which once handled 64 percent of the Western world's oil production, by 1982 handled less than 35 percent of it. Further, a full two-thirds of all OPEC production is controlled by members of the Organization of Arab Petroleum Exporting Countries, whose avowed aim is to use oil as a political weapon, while at the same time getting the maximum price for it. Only Saudi Arabia has attempted to act as a moderating influence.

The continuing upheavals in the Middle East as exemplified by the Iran-Iraq War and political turmoil in Iran have increased the concern for continuity of supply. At the same time, the increasing prices that the industrialized nations have been forced to pay for available oil have contributed to a halt of economic growth as well as extensive energy conservation and oil substitution efforts.

The realization by the industrialized countries of the economic consequences of ever increasing oil prices has accelerated their efforts to reduce their dependence on oil. Even though Canada is in an enviable position with respect to energy as a whole, being a net exporter, it still must be recognized that 15 percent of our oil consumption is met by imports.

Since 1980, the Free World's projected oil consumption has been reduced from an estimated 56 millions of barrels per day (MBD) (9 million cubic metres) to 47.5 MBD (7.5 million cubic metres) in 1982. However, rising consumption in developing countries is projected to result in a total requirement for 50.5 MBD (8 million cubic metres) by 1990. In the meantime, OPEC exports have been reduced from 31.4 MBD (5 million cubic metres) in 1979 to 16 MBD (2.5 million cubic metres) in 1982 resulting in their current account surplus of $111 billion in 1980, being reduced to a $60 billion surplus in 1982, with a projected deficit of $40 billion in 1983. OPEC will be faced

with production sharing, and price pressures will be more moderate than in the past. As a result, OPEC will be anxious to meet the small increment in oil production forecasted to be required by the early 1990's.

Virtually every proposal for adding to our energy supply involves hidden costs, unpleasant side effects, and uncertainties. Nuclear energy, for example although it already provides a third of Ontario's electricity, bears the handicap of worry over radioactivity - a worry that has been sharpened by Three Mile Island.

Coal also has serious handicaps. It contains sulfur and other undesirable substances, such as heavy metals, which are only partly removed from burning emissions despite costly and difficult procedures. The emissions pose hazards to human health and by reaction in the atmosphere form acid rain.

A longer term problem is the accumulation in the atmosphere of carbon dioxide from burning coal and other fossil fuels. Carbon dioxide tends to trap heat on earth's surface; in sufficient concentration it would create the greenhouse effect. Studies in both the United States and the United Kingdom forecast that the concentration of carbon dioxide by the middle of the next century will be double what it was before the industrial revolution. Such a concentration, say some scientists, could increase average global temperatures by two degress Celsius, and polar temperatures by as much as seven degrees. That much warming, slight as it may seem, would seriously affect distribution of rainfall and could create deserts of much of the Northern Hemisphere bread basket. It might be an irreversible catastrophe of unparalleled magnitude, affecting all mankind.

Other energy sources offer their own peculiar problems. Synfuels involve extensive strip mining, enormous cost, and demands for water that may be prohibitive. Solar electricity will also be costly.

Wind turbines will have to be given sites with great care to avoid aesthetic problems. The noise they produce has proved to be objectionable in some cases.

Alcohol from agricultural products for use in cars raises the specter of food versus fuel, and finally the burning of biomass favoured by some environmentalists, greatly worries others. They fear that there will be rapid destruction of forest lands and serious deterioration of agricultural soils if they are deprived of organic matter. There is, indeed, no free lunch.

Figure 1 compares the various prime energy sources that could be utilized for the generation of electricity within Nova Scotia and indicates that every source has some shortcomings.

FIGURE 1

COMPARISON OF PRIME ENERGY SOURCES FOR FUTURE ELECTRIC GENERATION
(Nova Scotia)

Source	Plant Capital Cost	Operational Cost	Lead Time	Perceived Environmental Impact	Estimated Environmental Impact	Effect of Inflation After Completion	Limitation
Nuclear	High	Low	12 years	High	Moderate	Low	Storage of spent fuel
Coal	Moderate	High	5 years	Moderate	Moderate	High	Pollution
Photovoltaics	High	Low	10 years	Low	Moderate	Low	Required area
Wind Turbines	High	Low	5 years	Low	High	Low	Noise location
Alcohol	Low	High	2 years	Low	Low	High	Food competition
Natural Gas	Low	High	3 years	Low	Low	High	Cost (royalties, taxes, production, distribution)
Oil	Low	High	Now	Low	Moderate	High	Supply
Tidal	High	Low	12 years	Low	Moderate	Low	Retiming
Biomass	Low	Moderate	3 years	Low	Moderate	High	Competition for other uses

2. CANADIAN ENERGY SITUATION

As previously pointed out, Canada is a net exporter of energy and is technically capable of becoming self-sufficient in oil if alternate energy sources are utilized to displace oil imports - new domestic oil, natural gas, coal and renewable energy, and nuclear and tidal power could all be used for this purpose. The realization self sufficiency will, however, require a concerted effort in order:

a. To conserve energy;
b. To develop alternate energy sources;
c. To reduce capital and operating costs of major energy projects;
d. To conserve our non-renewable resources to ensure provision for future needs.

Since the release of "Energy Outlook - 1990", a major step has been taken by the Government of Canada in its shift towards oil self sufficiency by the release of its "National Energy Program". The Federal Government's "National Energy Program" was announced in October, 1980 and subsequently updated in June, 1982. An agreement between the Federal Government and the Government of Alberta relating to "Energy Pricing and Taxation" was signed September 1, 1981 and updated on June 30, 1983. A similar agreement was signed with the Government of Saskatchewan. The Canada-Nova Scotia agreement on offshore oil and gas resource management and revenue sharing was announced on March 2, 1982.

A major purpose of the "National Energy Program" is to readjust the sharing of oil revenues between the governments, both Federal and Provincial, and the oil producers. The Government of Canada saw the previous division of taxes and royalties as concentrating the financial benefits of higher oil prices in one province, Alberta, with little benefit to the national government and the remainder of the country. The Federal Government contends the future of the conventional oil industry lies outside Western Canada. The Geological Survey of Canada calculates 22,000 exploratory wells will have to be drilled in Western Canada over the next 10 years to discover 2.6 to 3.3 billion barrels of oil.

By comparison, the MacKenzie Delta/Beaufort Sea could uncover the same reserves with only 75 wells. The East Coast offshore would require 150 wells to establish 2.4 to 3.6 billion barrels of oil. Estimates for additions to gas reserves show a similar imbalance in favour of the frontiers. However, frontier development requires substantial capital funds and lengthy lead times.

The major hurdle in the development of the frontier resources is the marketing of these resources in competition with (a) foreign imported oil and (b) conventional supplies which in the case of natural gas are in substantial surplus supply in Western Canada and short term surplus supply in the United States.

The magnitude of the required investments in these frontier resources results in the need to reach large markets in the United States. The Canadian markets are not large enough to provide the required economies of scale.

In its attempt to reduce Alberta's share of oil revenues, the Federal Government met determined opposition, and the province's decision to reduce oil production finally resulted in a modification to the original plan. This modification known as the "Canada/Alberta Memorandum of Agreement on Energy Pricing and Taxation" was signed on September 1, 1981, and established a revenue sharing and pricing formula for both oil and natural gas each year until 1986. However, a commitment was given to continue such schedules in future agreements and the new agreement reached on June 30, 1983 froze most Canadian production at $29.75 a barrel (about 75 percent of the world price) until December 31, 1984.

A second major purpose of the "National Energy Program" was to indicate the commitment of the Federal Government to increasing Canadian ownership of oil and gas resources. Since the Program was instituted, steps have been taken to strengthen Petro-Canada by having it acquire two major oil companies, Petro Fina, and B.P., which now gives it a coast to coast presence in the market place.

Changes made to the sharing of oil revenues have drawn the concentrated ire of the oil companies who explain that the reduction in cash flow will reduce exploration activities. The proposed reduction in foreign ownership and the less

favourable treatment of foreign-owned companies compared to Canadian firms has drawn harsh criticism from the United States government.

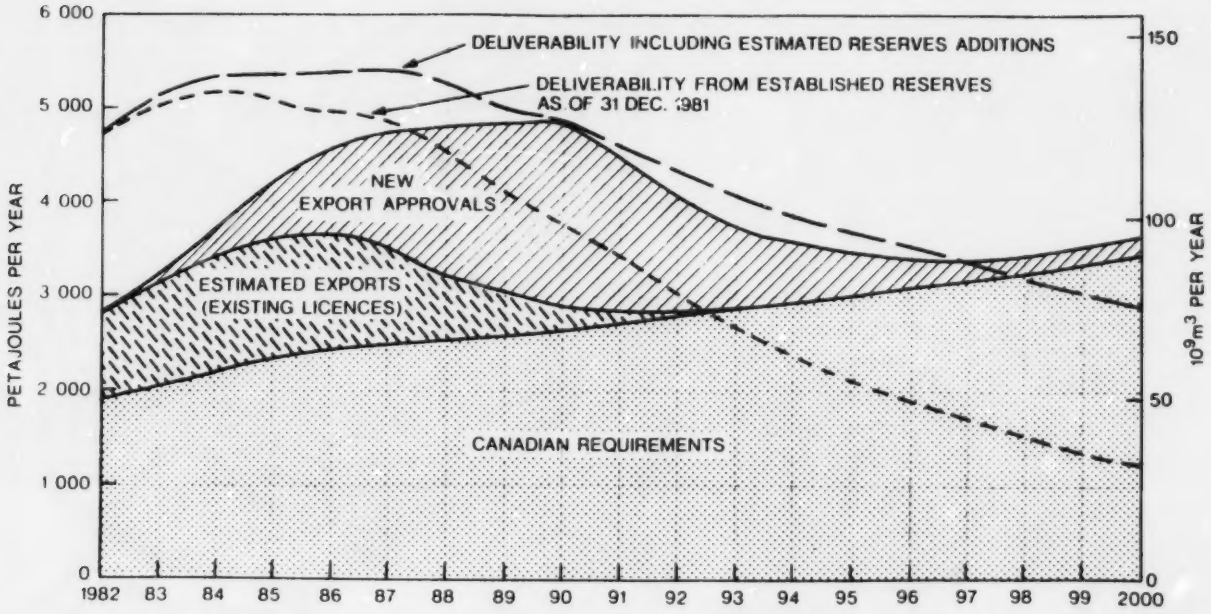
The key premise of the National Energy Program is that natural gas is plentiful in Canada compared to oil, and further work carried out by the National Energy Board has reinforced this belief. The latest information released by the Board in January, 1983 indicates that the established reserves have now reached 80.8 exajoules while 44.5 exajoules are forecasted to be added to reserves by the year 2000, from conventional areas alone.

As indicated in Figure 2, the conventional (excluding frontier and offshore areas) fields alone could supply all foreseen national gas demands to the mid 1990's including the recently approved additional 12.2 exajoule allowed for export. In addition, of course, substantial quantities of natural gas may be available from offshore and frontier areas.

It has been forecasted that production of oil from existing Western Canadian oil reserves will decline substantially over the decade and new discoveries will be required to offset this decline. The National Energy Program has recognized that unless drastic steps are taken the quantity of oil imported will continue to rise to make up the deficit.

Substantial price increases are forecasted by the Canada/Alberta Agreement for both oil and natural gas. The price of oil is based upon a blended price structure of conventional old oil (oil discovered before January 1, 1981) and new oil (includes synthetic oil). The conventional old price was guaranteed not to be greater than 75 percent of the world price; that is, the landed price of imported crude at Montreal, and the new oil price would not be greater than 100 percent of the world price. The blended price of Alberta crude oil at Montreal was forecast to be 61 percent of the world price in 1982, increasing to 84 percent in 1986. However, the actual price which had risen to 84 percent in 1983 because of declining international oil prices, has now been frozen at $29.75 a barrel (about 75 percent of the world price) until December 31, 1984.

FIGURE 2
NATURAL GAS - SUPPLY DEMAND



National Energy Board
Gas Export Omnibus Hearing, 1982

Natural gas will be purposely priced lower than oil at the Alberta border rising at a steady 50¢ per thousand cubic feet (Mcf) a year, with Alberta rebating 30 percent of the price paid for new gas sold in domestic markets to supply assistance and encourage the expansion of gas transmission and distribution systems into new market areas. The Government of Canada will establish the level of The Natural Gas and Gas Liquids Tax on domestic natural gas and natural gas liquids, taking into account a range of factors, so that the parity relationship between the wholesale price of natural gas at the Toronto City Gate and the average price of crude oil at the Toronto Refinery Gate will be approximately 65 percent, a reduction from 85 percent. The retail prices of natural gas will vary from distributor to distributor depending on

distribution costs which will be higher for the new distribution systems in the Maritimes compared with the distribution systems in Ontario and Quebec constructed more than 20 years ago.

Implementation of conservation measures is expected to result in the total Canadian oil product demand falling from the peak of 1,830 thousand barrels/day (Mb/d) reached in 1979 to 1,520 Mb/d in 1985 and a further decline to 1,470 Mb/d in 1990. Net imports are expected to continue at the rate of 240 Mb/d. These projections assume that annual economic growth will average 3.2 percent while primary energy demand increases at an average annual rate of 1.9 percent over the decade.

The slowing of the economies of the Industrialized World coupled with effective conservation has led to the well publicized current glut of crude oil on world markets. The necessity of all the OPEC nations, to meet increasing financial commitments has led to a significant lowering of crude oil prices on the spot market. Lowering world prices together with the provisions of the National Energy Program have, in the eyes of all oil companies, cast the economics of developing heavy oils and oil sands projects in grave doubt. The resulting recent collapse of the Alsands project, along with Imperial Oil's Cold Lake project indicates that Canada will not reach oil self-sufficiency by 1990.

The lower international oil prices have resulted in the Canadian Government assuming that there will be no nominal increase, in U.S. dollar terms, in 1982 and 1983. Thereafter, it is assumed that oil prices will increase at about 2 percent per year in real terms as shown in Table 1.

To illustrate that both conventional and blended oils are likely to reach the levels formerly forecasted, Table 2 compares the crude oil price projections at the time of the Alberta/Government of Canada agreement in September 1981 and the NEP update in June 1982.

The Alberta border prices for natural gas remain unchanged from that previously forecasted, however, since a 65 percent parity relationship between oil and

natural gas has been guaranteed, the Toronto city gate price will be well below that previously envisaged as shown in Table 3. Since Alberta will receive the price previously agreed to, the savings will reduce the Natural Gas Liquids Tax (NGGLT) revenues accruing to the Government of Canada, which will likely receive no revenue by 1986.

TABLE 1

WORLD OIL PRICE VIEW
($ Per Barrel)

	US WPI % Change	$US Price fob GULF	$US Price MTL	Exchange Rate	$Cdn Price Level	MTL % Change
1981		33.56	35.86	.834	43.00	
1982		33.41	35.14	.82	42.84	-0.3%
1983	7.11%	33.38	35.37	.81	43.67	1.9%
1984	7.07%	36.47	38.69	.81	47.77	9.4%
1985	6.56%	39.83	42.20	.81	52.10	9.1%
1986	6.12%	43.29	45.78	.81	56.52	8.5%
1987	5.55%	46.86	49.48	.81	61.09	8.1%
1988	5.37%	50.45	53.17	.81	65.64	7.4%
1989	4.87%	54.22	57.05	.81	70.43	7.3%
1990	5.0 %	58.0	60.94	.81	75.23	6.8%

NEP Update

From the above it is apparent that consumers will face significantly lower gasoline, heating oil and natural gas prices than anticipated when agreements with the producing provinces were reached. Table 4 illustrates the effect that these changes will have on prices at Toronto.

TABLE 2

**COMPARISON OF CRUDE OIL PRICE PROJECTIONS:
SEPTEMBER AGREEMENT AND UPDATE 82
($Barrel - Annual Average)**

	Landed Import Cost At Montreal (CIF)		Conventional Oil Wellhead Prices		Blended Oil Price	
	September Agreement	Update 82	September Agreement	Update 82	September Agreement	Update 82
1982	48.47	42.84	24.62	24.62	33.07	31.77
1983	56.02	43.67	31.75	31.18	40.99	37.39
1984	62.87	47.77	39.75	35.90	49.13	42.67
1985	69.62	52.10	47.75	39.30	56.98	47.84
1986	77.12	56.52	55.75	42.67	65.84	52.06
Percent of International (1)						
1982	-	-	50	59	68	69
1983	-	-	56	72	73	79
1984	-	-	63	75	78	83
1985	-	-	68	75	81	85
1986	-	-	72	75	85	85

(1) Landed import cost has been adjusted by appropriate quality differentials in order to calculate "Percent of International".

TABLE 3

**COMPARISON OF NATURAL GAS PRICE PROJECTIONS:
SEPTEMBER AGREEMENT AND UPDATE 82
($/MCF - Annual Averages)**

	Alberta Border Price		Toronto City Gate Price*	
	September Agreement	Update 82	September Agreement	Update 82
1982	2.15	2.15	3.60	3.77
1983	2.65	2.65	4.59	4.39
1984	3.15	3.15	5.41	4.84
1985	3.65	3.65	6.16	5.40
1986	4.15	4.15	7.10	5.90

including NGGLT but excluding Canadian ownership charge

NEP Update

TABLE 4

**CONSUMER PRICES AT TORONTO
(Annual Averages)**

	Motor Gasoline (¢/litre)		Heating Oil (¢/litre)		Natural Gas ($/Gigajoule)	
	September Agreement	Update 82	September Agreement	Update 82	September Agreement	Update 82
1982	45.1	41.5	30.6	29.0	5.63	5.51
1983	52.8	47.7	36.3	32.6	6.51	6.06
1984	60.9	53.0	42.2	36.1	7.45	6.61
1985	69.1	58.1	48.2	39.4	8.32	7.23
1986	77.9	62.5	54.8	42.2	9.42	7.84

NEP Update

3. CONSERVATION

3.1 GENERAL

After a somewhat hesitant start, conservation has emerged from the platitude stage to be a way of life for an ever increasing number of citizens in North America. Governments have implemented programs which have increased public awareness through information, demonstrations and incentives and have provided funds for research and development designed to increase energy efficiency. It has become universally accepted that conservation is the cleanest, most enduring, and in many cases, the cheapest way to reduce dependence on imported oil and achieve domestic energy balance. Conservation has resulted in changes to many sectors as follows.

3.1.1 Transportation

Liquid fuels provide virtually all energy used in transportation within Canada. They are so important because they are convenient to use, being easy to store, cheap to transport and highly concentrated. The more efficient use of oil, not only includes more efficient vehicles, but involves different ways to produce current fuels that would result in producing more light fractions and less residuals from each barrel of oil.

In 1973 the average Canadian auto consumed 17.2 litres of gasoline per 100 kilometers, but by 1980 the figure was 15.1/100 km. and was 14.1/100 km. in 1982. Not only is the smaller automobile travelling further on a given amount of fuel, but less energy is expended in its manufacture. Engine life has been improved through better combustion technology and lubricants while improved rust protection techniques have increased car life. Even though these improvements have not been obtained without cost, as attested by the ever increasing price of smaller automobiles, the results have been most impressive, and it is expected that by 1985 the average new automobile will use half as much energy as a 1975 car, and although there will be more cars on the road then, they will burn substantially less in total than they do now.

3.1.2 Industry

With government support, Canadian industry has taken major strides to improve energy efficiency in existing and planned plants, make better use of materials and energy that are normally wasted, and develop processes, equipment and products requiring less energy to manufacture or use.

Based on 1972 as a base year, Canadian industry had by the end of 1980 achieved a 15.4 percent average improvement in their efficiency of energy use. Expressed in other terms energy demand has been reduced by 307.3 petajoules per year, which is an energy equivalent of 7.95×10^6 cubicmeters (50 million barrels) of crude oil per year (or the output of one syncrude plant).

But the next target, to reduce unit energy consumption by 23 percent by 1985, may be harder to meet since it will depend on increased spending on such capital intensive refinements as installing more efficient boilers and furnaces, heat recovery systems and computerized environmental controls.

3.1.3 Buildings

Attempts have been made by the federal government to reduce energy use in the residential sector by means of an incentive program providing a grant to householders to help cover the cost of insulation material and labour. By the end of 1981, approximately 500,000 houses had been upgraded under the program. Since the Canadian government's role in housing is limited by constitutional arrangements to providing financial assistance, it has made the meeting of federal energy efficiency standards a condition of obtaining financial support for new housing.

With due consideration to both current and projected changes in energy, government, utilities and oil companies, have made the public aware of the cost benefits of energy conservation. Government incentive programs have been aimed at existing buildings, but similar incentives should be extended to new building construction.

The design of new buildings should be the most energy efficient economically possible. Since "economically" is the key word, it follows that new designs should be thoroughly reviewed as to expected energy use, and options should be "life-cycle" costed. In this regard, the adoption of the National Building Code and Measures for Energy Conservation by the province would be a step in the right direction. As well, there should be no tax penalties for incorporating socially desirable measures of energy conservation in new or old construction.

The Government of Nova Scotia should be a leader in both energy budgeting for new buildings and in the retrofit and conversion of existing buildings. In spite of the leadership shown by the Department of Mines and Energy in initiating programs to promote the use of conservation and renewable energy, other departments of government do not appear to be practicing what is being "preached" in that their design and budgetary requirements do not allow for an efficient energy design and interbranch financing does not encourage energy conservation in existing buildings. The construction sector is of the opinion that some office space leased by government in the Halifax area is among the most inefficient available.

3.1.4 United States Experience

Since 1973, conservation in the United States, the world's largest user of energy, has curtailed the demand for energy by 2.3 percent a year, while GNP rose at 2 percent a year. At the same time, while oil consumption fell annually by 1.6 percent the higher price encouraged increased domestic oil production resulting in a 32 percent decrease in oil imports. Accompanying the decrease in the use of energy has been an increase in the use of electricity.

4. NOVA SCOTIA ENERGY SITUATION

Historically, although Nova Scotia has seen imported oil supplying 83 percent of its primary energy demand, it had by 1981 dropped to 72 percent while 39 percent of the Canadian primary demand was supplied by oil - only 14 percent of it imported.

Recognizing that dependency on foreign oil, with its escalating cost and insecurity of supply resulting from scarcity and political instability in many of the producing countries, had to be minimized, the province published in early 1980, "An Energy Plan for Nova Scotia" which recognized three main principals:

a. Conservation of the province's energy resources.

b. Self-sufficiency to the extent feasible within Nova Scotia.

c. Enhancement of the environment.

The present oil glut has placed Nova Scotia on the horns of a dilemma. For the past decade the province has pinned its hopes for prosperity on the prospects of an offshore oil and gas boom -- but now the international oil market has softened. This dramatic change in the oil market, compounded by the National Energy Program, has affected both the operations and attitudes of all oil companies and threatens to further delay the development of potential natural gas finds.

The Energy Plan, which in essence proposed the switch from oil to coal-fired generation of electricity, was reviewed by Voluntary Planning and the response is attached to this report as Appendix F.

The OPEC nations have, in the face of the oil glut, been unsuccessful in maintaining the price of oil at the posted price. Their excess capacity, combined with increases in non-OPEC production, conversion to other fuels, and conservation have, and will limit crude oil price increases. Nova Scotia, for its part, has reduced its use of oil by constructing coal fired electrical generating plants. The province has also, in conjunction with the Federal Government, supported conservation in the private sector by the EnerSave Program and the demonstration of new energy technologies by means of the Federal/Provincial Pilot Project Program.

4.1 MARITIME ENERGY CORPORATION

"Energy - A Plan for Nova Scotia" strongly recommended the formation of a Maritime Energy Corporation (MEC), a position we strongly agreed with, and in fact, it had been a major recommendation of our former report "Energy Outlook - 1990."

As contemplated, the MEC would have offered several advantages to Nova Scotia; namely:

a. make available several electrical generation options in addition to those now economically available;

b. enable the corporation to raise large amounts of capital at lower effective interest rates than could any province by itself; and

c. result in lower operating and capital costs due to the economics realized as a result of regional planning with the final result of lower costs to the consumer.

New Brunswick and Nova Scotia have chosen to develop the energy resources within provincial jurisdiction that will, in the short term, create the greatest socio-economic impact on each province. Both have identified the New England market as being willing and able to accept their excess power whether from Point Lepreau or Fundy Tidal.

New England has become highly dependent on nuclear energy so much so that reactors produce 80 percent of the electricity in Vermont and 60 percent of Maine's electric power. The highly publicized nuclear accident at Three Mile Island in 1979 has caused public attention to become sharply critical of this energy source making the future of nuclear power unclear. As a result and in an effort to reduce the importation of oil for electrical generation, the New England market as represented by the New England Power Pool has indicated an interest in purchasing power from Canadian sources.

Since the construction of large power generation projects in the Atlantic provinces must be dependent on the ability to market the excess power, which the region cannot initially absorb, it is most timely that the New England area, requiring

other sources of electrical energy, looks toward the Atlantic Region where it is believed reliable power can be obtained at a negotiated price.

If the New England Power Pool is to be served, it will require the cooperation of the three energy-producing provinces in the Atlantic region - Nova Scotia, New Brunswick and Newfoundland. They will jointly have to:

a. negotiate the design and cost of a grid to transport the energy, as well as to

b. economically supply the regional demand.

Operating within a MEC, Nova Scotia could take part in developing a regional power grid and take advantage of major electrical generating projects such as tidal power in the Bay of Fundy, nuclear plants in New Brunswick and hydro sources in Quebec and Newfoundland.

Given that the Maritime Energy Corporation has not been incorporated and given that it is technically imprudent, due to size of commercially available reactors, if not impossible for Nova Scotia to adopt a nuclear option on its own, only two options remain, namely: coal or oil fired electrical generation. The questions then are (1) is coal fired electricity more economic than oil fired, (2) is Nova Scotia coal the most economic coal supply for the generation of electricity in Nova Scotia.

4.2 COAL

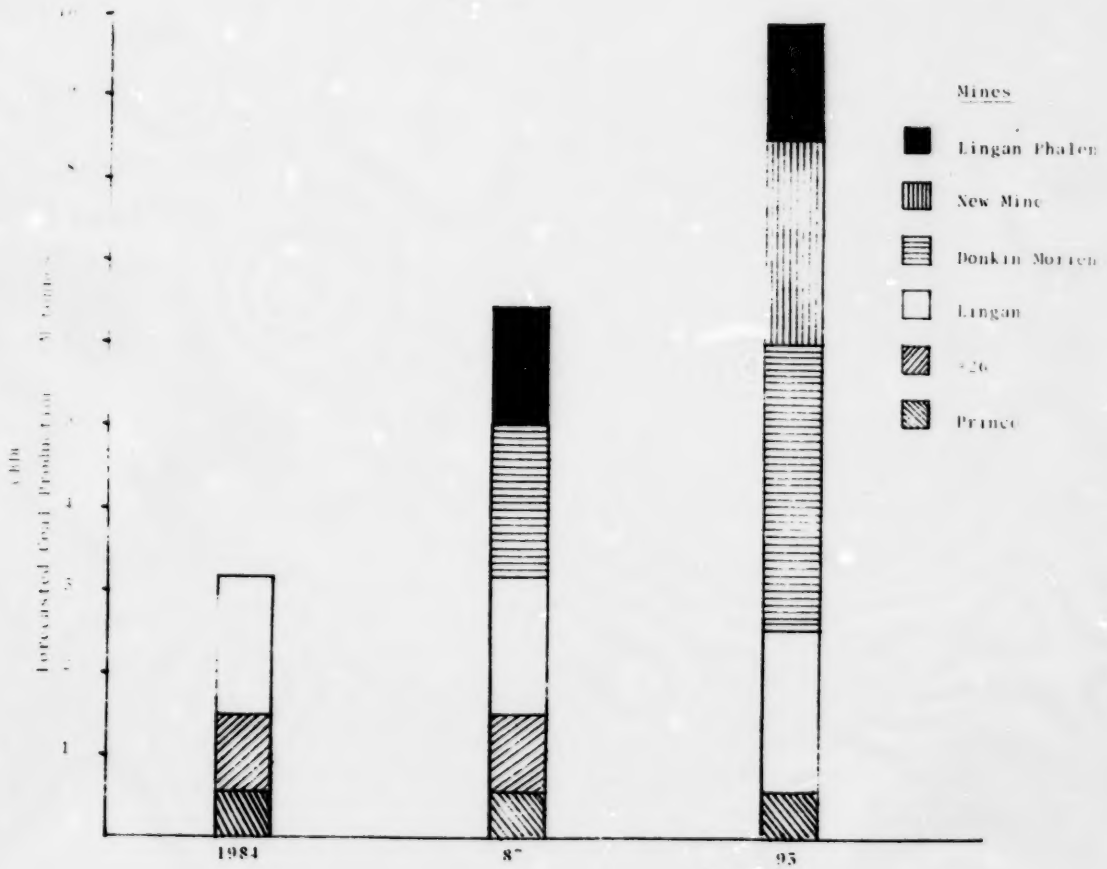
4.2.1 Supply

Since the release of the former report "Energy Outlook 1990," additional exploration (core drilling) has raised the level of known recoverable coal reserves to about one billion tonnes in the Sydney Coal Field. Consistent with this addition are the expectations that coal production in the province could expand to an annual level of 10 million tonnes by 1993. This level of production would be based on the following as shown by Figure 3:

a. At present, the Cape Breton Development Corporation (CBDC) has facilities enabling them to produce a total of 2.7 million tonnes of

coal annually (approximately 1.35 million tonnes each of metallurgical and thermal). By 1984, when the Prince Mine becomes fully operative, the total annual production capacity has been forecast by CBDC to be 3.2 million tonnes. By 1987, when the Donkin-Morien Mine is forecasted to begin production, the total annual output from these mines is expected to be 5 million tonnes, and by 1993, 7 million tonnes.

FIGURE 3



b. The Corporation expects shortly to begin the development of a new mine, the Lingan Phalen Mine. Feasibility studies have been completed, and financial arrangements are being put in place. If these arrangements are completed in fiscal 1983/84, the mine could produce 1.4 million tonnes annually by 1986/87.

c. The Corporation also plans to replace the No. 26 Mine with a new 2.5 million tonne mine by the early 1990's.

d. Novaco (a provincial crown corporation) had been forecast to produce a total of 200,000 tonnes of coal annually by strip methods. However, the main advantage offered is the corporation's ability to produce coal rapidly in the event of an emergency requirement.

4.2.2 Demand

A projected requirement by Nova Scotia Power Corporation for thermal coal of 2.7 million tonnes by 1988 includes the conversion of some present oil-fired thermal plants such as Tufts Cove and Point Tupper to coal. If these conversions do not take place, and if new coal-fired plants are not constructed, the thermal requirement would total 2.2 million tonnes per year as follows:

a. Trenton, Glace Bay and Maccan

The NSPC burns coal at these thermal generating plants. Glace Bay and number 5 unit at Trenton are both dual-fired. The amount of coal burned depends on the utilization of the station. The requirement could be 0.8 million tonnes of coal annually.

b. Lingan (dual-fired)

Two coal-fired generating units of 150 MW each are in operation with a further two under construction and scheduled for completion by 1984/85. Each unit will require up to 360,000 tonnes of coal annually.

The total identified demand by 1988 for Nova Scotia coal is projected by CBDC as follows:

	Tonnes
Electrical Generation	2,200,000
Industrial (mainly cement plants)	720,000
Sydney Steel	450,000
Stelco	180,000
International Sales	1,320,000
	4,870,000

Markets have not been identified for all the coal that could be produced (10 million tons by 1993), but the major producer is convinced, on the basis of studies completed to date, that commercially attractive markets will be available.

The conclusion is reached that there is sufficient coal from Nova Scotia sources to meet the stated requirements of the Nova Scotia Power Corporation, the Sydney Steel Corporation, other domestic customers and an export market.

4.2.3 Cost of Production and Price of Coal

In order to supply coal to both domestic and international markets, CBDC presently operates three coal mines, one coal preparation plant, a railroad, shipping pier, and repair and maintenance facilities. The total employment now approximately 4,700 persons, is projected by CBDC to grow to 8,000 persons within the present decade.

In order to improve the Corporation's ablity to serve export markets, construction of a railway maintenance centre and major improvements to the shipping pier are underway. It has been estimated that these improvements, when added to the development of new mines, will require the expenditure of some two billion dollars over the next decade. This sum is unlikely to be provided by capital markets or the Federal Government unless it can be demonstrated that the expansion can be economically supported by the market place.

Reference is made to a study released in 1982 by Merrill Lynch, Economics Incorporated, in which they examined coal as a source of electrical energy based on the maximum price coal can reasonably be expected to demand on the international market. Their study calls for coal prices (long term contract basis) in the United States to increase about 8 percent each year, or 2 percent above inflation to 1992. This is substantially less than the 8 percent per year real growth exhibited during the last decade. Two factors are largely responsible for this trend. The industry in the United States has more than 150 million tonne of excess productive capacity and supplies are expected to remain greater than demand restraining the expansion of coal prices. The 1990 price for coal in the United States (presumably at the pit) on the above basis would be between $75 and $80 per tonne in 1982 Canadian dollars. (Based on a tonne of coal containing 29.3 giga joules).

This study also projects oil prices to grow at the slower rate of 6-7 percent per annum over the same period. Since coal is presently, in the United States, only one-fourth the cost of oil on an energy content basis, coal will still sell for 60 percent less than oil by 1992. If it is assumed that the cost of mining, transporting, and using coal in an environmentally acceptable manner, will add 100 percent to its cost, coal should continue to be priced at a substantial discount with respect to oil for the foreseeable future.

In line with the above scenario for coal and oil prices two recent studies carried out in the United States concluded that a new coal-fired facility will continue to enjoy a significant advantage over the costs of generating electricity fro n a new oil unit at existing and forecasted fuel costs. Table 5 provided by Imperial Oil Limited illustrates the projected situation in 1990. (These projections are based on different base prices and assumed price increases for coal than those in the previously quoted Merrill Lynch study.)

These comparisions explain why coal has been replacing oil as a generating fuel for electricity in new plants around the world, including Nova Scotia. Available reports suggest that, as a general rule, the conversion of many existing oil-fired plants to coal are unlikely to be economically justified although their replacement by coal-fired plants could be.

TABLE 5

COST OF ELECTRICAL GENERATION - 1990

1982 U.S. ¢ per kwh	Coal Fired	Oil Fired World Price	Oil Fired Canadian Price
Cost of Plant	1.1	0.9	0.9
Operations & Maintenance	0.6	0.2	0.2
Fuel Cost	3.7(1)	6.0(2)	5.4(2)
Total	5.4	7.1	6.5
Canadian Currency	6.7	8.8	8.0

Assumptions

- Light Arabian oil reached $40 per barrel in 1990
- Coal prices FOB escalate at about 5 percent per year real
- Canadian $ = .81¢ U.S.

1 includes unloading. 1990 landed price of $93 ton
2 heavy fuel oil at 85 percent of crude price

It appears, therefore, that decisions by NSPC to substitute coal for oil, were economically sound, although there are no guarantees that the projected oil/coal price relationship will come to pass.

The question arises as to the most economic source of supply of coal to meet the requirements of NSPC. If the CBDC can produce coal at competitive prices and market it profitably in overseas markets it becomes the logical source of supply.

A compilation of financial data as taken from the Annual Reports of the CBDC for the past four years is shown in Table 6. These data indicate that the Corporation has been unable to make a profit on its total coal sales and the cost per tonne does not allow return on investment. Its loss was particularly significant in 1981/82, a year in which a 12-week work stoppage occurred.

TABLE 6

COAL COSTS - DERIVED FROM CBDC ANNUAL REPORTS

	1981/82	80/81	79/80	78/79
Revenue $M	109,200	127,000	112,978	117,501
Tonnes coal sold (000)	1960	2678	2302	2522
Cost/tonne	81.02	57.42	64.53	60.62
Price/tonne	55.71	47.42	49.08	46.59
Total Losses $M	22.33	10.55	18.26	12.56
Loss/tonne	25.31	10.00	15.45	14.03

Despite the overall results reflected in Table 6, it cannot be concluded that the production of coal by CBDC for international sales has been (or will be) unprofitable. The price per tonne is an average based upon the total coal sold to all customers, domestic and overseas. A comparison of these figures with recent international prices (see Table 7) shows that international prices are higher than the average price on total sales realized by Cape breton Development Corporation. Note that the figures in Table 7 are spot prices that fluctuate over a wide range.

TABLE 7

SPOT PRICES OF THERMAL COAL AS OF MID 1982 (FOB PORTS)

	Country	Price Cdn. /$tonne
Export (FOB)	South Africa	$ 57.58
	U.S. (Eastern Seaboard)	56.09
Import (laid down)	France	71.40
	Spain	71.40
	U.K.	73.80
	Germany	80.80

A mid 1982 trade journal article indicated that a New England generating plant recently paid between $79 and $86 Canadian per tonne for their coal. This coal was to be of no greater than 1.5 percent sulphur with a penalty of $.60 being applied to each .1 percent that this limit was exceeded. The type of coal that is currently being purchased by the Nova Scotia Power Corporation contains roughly 3 percent sulphur. Extrapolating the above formula it would be priced at between $69 and $76 per tonne, although there is no indication that this sulphur content could be tolerated by the American customer.

Longer range price projections for coal have a favourable connotation for the CBDC. A 1990 price (expressed in 1982 currency) of $83 or higher has been indicated by them although caution about long range projections must be stated in view of the potential rapid change in key assumptions.

It can be concluded however, that the international price climate and outlook are attractive enough, in light of the overall cost performance of CBDC, to justify a careful evaluation by the company of its potential expansion choices. There is a very good chance that the forecast expansion of capacity can take place on an economically sound basis. There is just not enough information available to either endorse or oppose the notion of commercial viability of the operations and plans of the company with respect to its role as an international coal supplier. If CBDC is able to develop economically viable opportunities in export markets, it follows that the Corporation should be also able to supply the requirements of the NSPC at a competitive market price.

4.2.4 Environmental Considerations

Public concern over the emissions generated by the increasing use of relatively high sulphur content coal is receiving widening public attention.

At the same time, in view of Canada's commitment to achieve political resolution with respect to emission control across the U.S./Canada border, it seems imperative that acknowledgement of the potential environmental consequences of

implementing any energy option be given serious consideration. While it is recognized that Nova Scotia's contribution to the acid rain problem is minimal, it is believed that the Federal government will find it necessary, for political reasons, to get its own house in order before crying "foul" at our neighbour to the south.

Technology is available, and proven, to reduce particulates and oxide of nitrogen. The removal of sulphur, however, offers more severe problems. While technology is available, scrubbers are expensive to build, operate and maintain and exchange the air problem to one of dealing with solid waste. Their use results in a reduced plant availability and the total costs involved could reduce some of the advantages coal-fired thermal generation now enjoys.

4.2.5 Other Considerations

It must be recognized that the Petroleum Compensation Charge, the proceeds of which are paid as compensation to refineries who must use imported crude, serves as a subsidy which has in the past had the effect of making coal less competitive in the domestic market than it is in the international market. This imposes a burden upon the financial position of the CBDC.

The original mandate of the CBDC was to phase out the then uneconomic coal industry in Cape Breton and to replace it by developing a broader economic base. In attempting to meet this original mandate, social costs, generated by decisions such as to grant pre-retirement leave, were accepted and in some cases are still borne by the Corporation.

With the major changes in the whole energy industry because of the rapid unexpected increase in the price of oil, the mandate of the CBDC has been implicitly if not explicitly changed so that the coal operating sector is now expected to grow within the constraints of commercial competitiveness and economic viability. Because of this dramatic change in direction, there is still confusion within the community between the social and commercial activities and objectives of the CBDC.

As was true at the time of CBDC's inception, there is still no strong, growing base of industrial activity in Cape Breton capable of absorbing the available labour force. Since the continuation of coal mining is seen by many as being the only possible major source of employment, it has been the contention for some years that the far reaching social implications of the whole coal problem must be given precedence over the purely economic implications. This leads to the conundrum of whether CBDC should be an independent industrial enterprise or an instrument of Government policy, rendering effective decision making difficult. Decisions which are proposed on the basis of sound economic principles must compete with what is judged to be in the national provincial or even political interest. The change in direction which has been taken by the CBDC requires that the Act which gave it birth be changed to accurately reflect its new mandate.

It is expected that the consumption of metallurgical coal used in the steel industry will continue to decline as the industry continues to phase out basic steelmaking and replace it with electric furnace steelmaking. This transition is occuring because they are more efficient, cheaper to maintain, require less space, and levels of output can be more easily varied. Based on current rates of substitution, it is believed that the open hearth furnace will be completely phased out by the early 1990's. Fortunately Cape Breton's metallurgical coal is also a high quality thermal coal and as has been noted, is presently sold in Germany for this purpose.

New technology also provides other alternatives for Cape Breton coal. Studies are underway into gasification and liquefaction of coal to provide transportation fuels and petrochemical feed stocks. The addition of a new coal blending facility will also permit the blending of thermal and metallurgical coals to permit further penetration of overseas markets. The development of coal liquid mixtures also offer increased opportunities for the use of coal.

The coal mining industry will have a significant positive impact on employment in Cape Breton and on the Nova Scotia economy in general. It has been estimated that by 1990, if all the proposed underground mines are developed, total

employment (direct or indirect) in the province, attributable to coal mining could reach 17,000. In addition, about 56 percent of the capital funds expended will return to the province in the form of direct and indirect household income.

4.3 OIL USE

In examining present and projected oil consumption levels, it was decided to treat the four Atlantic provinces as one market region. However, where readily available, Nova Scotia consumption figures are noted.

Energy supplied by oil products is utilized in five general areas, namely: transportation, electrical generation, industrial, residential, and commercial with transportation being responsible for approximately 39 percent of the total consumption (see Table 8).

In examining transportation requirements, present and projected consumption levels were deemed to be met almost exclusively by oil and were allotted between road, air, rail and marine applications.

Passenger car requirements for motor gasoline currently represent the largest component of road use. Key factors influencing requirements include projections of model year efficiencies discounted for real driving conditions, fleet efficiencies recognizing real efficiencies and car use by age, the number of licenced drivers and average miles travelled per driver. Assumptions were also made of the extent to which automobiles would use diesel fuel and propane instead of motor gasoline.

Road use also includes requirements of motor gasoline and diesel fuel for trucks. Estimates were made of potential improvements in truck efficiencies.

Air use, largely turbo fuel, currently constitutes about 9 percent of this sector. Key factors underlying this component of energy use for which estimates were made include demand for air travel and improvements in operating efficiency. It was specifically assumed that no new technological breakthroughs would occur.

TABLE 8

ATLANTIC PROVINCES TRANSPORTATION DEMAND PROJECTION - PETAJOULES
Nova Scotia ( )

	1980	1990	2000
Road	143 (49.52)	122	105
Rail	7 (2.29)	7	7
Air	16 (4.66)	20	23
Marine	21 (14.82)	23	24
TOTAL	187 (71.29)	172	159

Rail use, largely diesel fuel, constitutes about 5 percent of this sector. Key factors underlying this component of use for which assumptions were made include rail freight requirements and potential improvement in the efficiency of rail operations.

Marine use, both diesel and bunker fuel, constitutes about 6 percent of this sector. The main assumptions made to project marine energy use include constant dollar GNP, the potential for improved efficiency and the competitive position of bunker fuel on Canada's Atlantic Coast versus European ports.

As has been pointed out, passenger car requirements for motor gasoline currently ranks as the single greatest contribution to the requirement for imported oil. However, it appears that a combination of many factors, including conservation awareness and redesign resulting in lighter more efficient automobile, has resulted in a marked decrease in the use of gasoline between 1980-81 by Atlantic Canada drivers. This time-frame has seen, in fact, a reduction of 5.1 percent in retail gasoline sales as reported by the oil companies.

The generation of electrical energy within the Atlantic region is presently accomplished from four main sources; namely, oil, hydro, coal and nuclear recently added. In arriving at the projected demand for oil products in this application as shown by Table 9.

a. Total requirements for electricity in each region were developed by aggregating the demand for the residential, commercial, and industrial sectors and adding requirements for transmission losses.

b. Estimates were made for generating capacity available in each region based on capacity currently available or under construction, and assumed additions required to meet demand. Total capacity requirements were developed from historical service factors and load factors. Fuel choice for new capacity was made on the basis of announced long-range strategies of the electric utilites.

c. Fuel requirements were then developed from the projected need for electricity, generating capacity assumptions, and likely utilization levels for each type of capacity. The projections were based on historical fuel efficiencies.

TABLE 9

ATLANTIC PROVINCES ELECTRICITY GENERATION
DEMAND PROJECTION - PETAJOULES
Nova Scotia ( )

1980		1990		2000	
Oil Products	Total	Oil Products	Total	Oil Products	Total
91 (41.32)	302 (81.29)	45	426	40	456

The availability of natural gas and the greater use of electricity will impact on the residential, commercial and industrial sectors by 1990, resulting in a decreasing proportion of the total energy used by these sectors, being provided by oil products. The lowering of oil demand by these sectors is shown by Tables 10, 11, and 12.

TABLE 10

ATLANTIC PROVINCES RESIDENTIAL ENERGY DEMAND PROJECTION - PETAJOULES
Nova Scotia ( )

1980		1990		2000	
Oil Products	Total	Oil Products	Total	Oil Products	Total
72 (37)	109 (46)	46	104	23	107

TABLE 11

ATLANTIC PROVINCES COMMERCIAL ENERGY DEMAND PROJECTION - PETAJOULES
Nova Scotia ( )

1980		1990		2000	
Oil Products	Total	Oil Products	Total	Oil Products	Total
26 (16)	39 (22)	14	46	9	61

TABLE 12

ATLANTIC PROVINCES INDUSTRIAL ENERGY DEMAND PROJECTION - PETAJOULES
Nova Scotia ( )

1980		1990		2000	
Oil Products	Total	Oil Products	Total	Oil Products	Total
99 (19)	177 (62)	61	218	52	259

Energy requirements for electric generation, measured on an input-equivalent basis, are projected to reach 45 percent of total primary energy requirements by the year 2000 versus 37 percent today. The rate of growth in domestic electricity demand over this period is 3.2 percent per year.

4.4 NATURAL GAS

Natural gas has been found in the Sable Island area in what is now considered to be commercial quantities. Mobil Oil announced on June 24, 1982 that the gas reserves delineated to date are large enough to enable their development, however, many hurdles must be overcome before the construction of the production facilities can proceed, including the demonstration of financial feasibility and sufficient return on the investment. Financial feasibility will depend to a large extent on the prices that can be obtained in the natural gas export market in the northeastern states and the royalties and taxes to be paid to the Federal and Provincial governments. The natural gas market in the Maritime Provinces is not large enough to support the large investments of three billion dollars required in the offshore facilities.

The Nova Scotia market for natural gas will be developed using the first gas available from either the Sable Island area, or failing that, the Western Canadian provinces. The TOM pipeline has now been delayed again and apparently can no longer be justified with the result that the company's New Brunswick and Nova Scotia offices have been closed. The lead time required to develop the Sable Island natural gas resources is substantial. Mobil Oil forecast the earliest natural gas could be made available is late 1987 or early 1988. This leaves a considerable amount of time during which the natural gas market in the Maritime Provinces could possibly be predeveloped using propane.

After having initially denied an application to construct new natural gas facilities in Quebec and the Maritimes in May, 1980, the National Energy Board in August 1981, recommended approval of a similar application made by TQ&M Pipeline. The Board's recommendations were subsequently approved by the Governor-in-Council enabling the Board to issue a Certificate of Public Convenience and Necessity, (Number GC-68) in December 1981. The Certificate includes a number of conditions to give effect to the purposes and provisions of the National Energy Board Act and to help the Board to discharge its continuing supervisory duties over the construction and the operation of the pipeline.

> "In the Board's view, the pipeline should be built because the TQ&M project is an important means of protecting the Maritimes against possible interruptions in the supply of imported crude oil. The Board considers the contribution of the TQ&M project towards security of supply to be significant and finds this to be in the public interest."

The decision of the Board was based on the application of TQ&M filed in December, 1980. At that time, TQ&M had estimated that gas would be made available in Halifax in 1983. This date was consistent with the date outlined in the National Energy Program, October 28, 1980. The National Energy Board hearings took longer than TQ&M had expected, and subsequent to the decision of the NEB, TQ&M reassessed their construction schedule and advised that the pipeline would not reach Nova Scotia until 1985. The National Energy Program Update made it clear that because of further delays completion of a pipeline to Halifax could not be expected prior to late 1986.

In September of 1979, detailed market studies, detailed engineering facility studies and financial feasibility studies were completed. In 1980, ICG Scotia Gas Limited and the Nova Scotia Power Corporation made separate applications to the Nova Scotia Government for the franchise to distribute natural gas in Nova Scotia under the Gas Utilities Act.

Forecasts show natural gas available in 28 communities along the TO&M pipeline route. The piping of these communities supplying about 64,000 customers will require a capital outlay of more than $500 million by 1990. In addition to these communities, plans include the supply of natural gas to communities in the Annapolis Valley as far west as Waterville. The Distribution System Expansion Program, DSEP, announced by the Federal Government in general terms, but not yet delineated in final form, would provide funds to assist in the addition of some of the less economic communities. Application will be made by the natural gas distributer for funds to supply service to as many communities as possible including those on the South Shore and further west in the Annapolis Valley.

By 1990, natural gas sales are expected to be about 30 petajoules or the equivalent of about 5 million barrels of imported crude oil. In 1980, oil used in the stationary market sectors totalled about 17 million barrels. Assuming no increase in oil requirements for the next 10 years, natural gas would displace almost 30 percent of the fuel oil in the stationary market sector. Assuming no increase in total energy requirements of the Province from 1980 to 1990, then natural gas would supply about 11 percent of the total primary energy needs of the Province. This is not as substantial as coal when we consider that coal in 1981 supplied 22 percent of the primary energy needs and this percentage will be increasing substantially when coal displaces more heavy fuel oil used for thermal power generation.

There are more than adequate supplies of natural gas in Western Canada that can be made available for the Nova Scotia market. The tremendous excess supplies available have resulted in new export approvals to the United States and Japan.

In its report, "The Canadian Energy, Supply and Demand, 1980-2000," June, 1981, the National Energy Board stated "because of lack of markets, only 71 percent

of the available capability of natural gas was utilized in 1980, with production averaging some 2,700 petajoules for the year."

Established reserves of natural gas are estimated by the Board to be 80.8 exajoules as of the year 1983. At current production rates of 2.7 exajoules per year, this is equivalent to about 28 years of supply. To put the Nova Scotia requirements in perspective, the forecast 1990 natural gas requirements for Nova Scotia are equivalent to 1 percent of the total 1980 production in Canada.

The NEB publishing its "Reasons for Export Decisions" in January, 1983 estimated that supplies from currently established reserves and forecasted additions to conventional reserves will meet both domestic and additional export requirements for the next 14 years. It is not likely, therefore, that frontier gas will be required before 1998 to serve domestic markets.

The National Energy Board, in its reasons for decision in the TQ&M application referred to earlier, found at page 5-1 Views of the Board "The Board is satisfied that the Pan-Alberta and TCPL have adequate supply capability from currently contracted reserves to meet their present requirements and those of the TQ&M market until 1987. The Board is aware that there is adequate supply in Alberta beyond that date to meet foreseen requirements for the domestic market. The Board considers that they will be able to contract for the additional gas needed to meet any future requirements."

In conclusion, the abundant natural gas supply in Western Canada could be made available in the Maritime Provinces and the security of our energy could, thereby, be substantially enhanced.

4.4.1 Sable Island Gas

On June 24, 1982, Mobil Oil announced that the Venture Structure off Sable Island holds enough gas for commercial development. Daily production of 400 million cubic feet per day will be needed from a total reserve of something less than 3 trillion cubic feet. Fiscal arrangements must be worked out with the federal and provincial governments to make sure Sable is a viable project. The plan is to construct

offshore platforms from which gas and liquids would be transported via pipeline to the mainland, near the Strait of Canso. There gas would be separated from gas liquids and processed into marketable products. A pipeline would transport the gas to the markets in Nova Scotia and New Brunswick and for export near St. Stephen, N.B. A connecting pipeline would transport the gas to interconnections with the existing U.S. pipelines serving the Northeastern United States.

Despite positive steps being taken towards eventual production, there are still many questions that must be answered before full scale development proceeds. These questions include the price at which the gas will be sold, the specific operating costs, and taxes and royalties to be paid.

Mobil also must obtain all government approvals and permits to develop, transport, and sell natural gas. It must decide on the type and cost of facilities, it must secure the appropriate markets, and it must raise the necessary money to finance such a mega project.

A major hurdle was overcome in March of 1982 when the provincial and federal governments signed their offshore oil and gas agreement. This agreement helps to provide the necessary stable political climate for such a massive capital outlay.

The contingent raw gas resources estimated by Mobil Oil for the Scotian Shelf are shown by Table 13.

An announcement was made on May 12, 1982 outlining the formation of a new pipeline company, Sable Gas Systems Limited, to construct and operate (a) the offshore pipeline to transport natural gas and liquids for processing at or near the Strait of Canso and (b) the onshore pipeline to transport natural gas to the natural gas distribution companies in New Brunswick and Nova Scotia and to the United States Border.

TABLE 13

CONTINGENT RAW GAS RESOURCES
SCOTIAN SHELF
($m^3 \times 10^6$)

AREA	PROVED	PROSPECTIVE	PROVED PLUS PROSPECTIVE	POSSIBLE	P+P+P
Sable Island	3,437	0	3,437	---	3,437
Thebaud	2,564	7,635	10,199	3,888	14,087
Cohasset	---	---	---	---	---
Citnalta	0	8,170	8,170	1,296	9,466
Intrepid	0	3,043	3,043	1,493	4,536
Venture	26,727	15,721	42,458	28,653	71,111
TOTAL	32,738	34,569	67,307	35,330	102,637
TOTAL (tcf)	1.16	1.22	2.38	1.25	3.62

The new company will carry out feasibility studies and initial planning. Construction of the pipeline is predicted on commercial reserves being proven. When development of the offshore natural gas begins, the company will proceed with detailed engineering design and construction. Initially, ownership of the new company will be shared equally between Nova Scotia Resources Limited and TransCanada Pipelines Limited.

4.5 TIDAL POWER

The concept of tidal power is not new and has been the subject of numerous studies in many areas of the world, but to date, only two tidal projects (one each in France and Russia) have actually been completed. The Bay of Fundy has been studied intensively as a result of being one of the world's best examples of tidal range

variation. All earlier studies indicated that none of the schemes examined would provide power competitive with alternate sources, but a study completed in 1978 offered enough hope that a pilot project was subsequently approved.

At the present time, North America's first tidal power plant exists at Annapolis Royal on the existing causeway across the Annapolis River. The project will test a 20 MW straight-flow turbine, the largest of its kind in the world, to determine if it is suitable for use at other potential low-head hydro sites throughout the world, including large-scale development of tidal power in the Bay of Fundy. Scheduled for completion in 1983, the demonstration project, which will replace 80,000 barrels of oil annually, will cost an estimated $46 million, of which $25 million will be contributed by the federal government under an agreement with the province.

A study to provide the latest cost information on large-scale tidal power development in the Bay of Fundy, "Tidal Power Update '82," was released in 1982, and the results have recently been released. Two sites have been under active consideration, one at Cumberland Basin designated A8 and another at Minas Basin, designated B9. Design data for site A8 indicates a potential of 1085 MW, while B9 has a potential of 4,800 MW and involves the construction of a barrage extending from Economy Point to Cape Tenny, a distance of approximately 8 kilometers.

The costs of storing and re-timing the output of these schemes would likely make the projects completely uneconomic, and it is obvious that Nova Scotia could not absorb the raw power generated. As a result, the province is placing emphasis on the New England and New York areas as the potential markets for electricity generated from large scale tidal power development. The size of this market is such that the Minas Basin location, with its greater capacity and lowest at site cost of electricity, had been favoured over the Cumberland site in the most recent study and will be the subject of continuing detailed examination.

The successful completion of the pilot plant will substantially increase the perceived viability of a full scale tidal installation, and since the pilot plant will be operational in the very near future, it would be premature to comment further at this time.

4.6 NUCLEAR POWER

Nuclear energy is unique in that of all energy options it is, without doubt, the most controversial. The debate surrounding it is the most intense and the issues involved most fundamental, ranging from health impacts on future generations to the type of industrial society which we wish to see emerge. It is the energy option for which the views of the professional diverge most radically from the perceptions of the public.

In considering the nuclear options, it must be recognized that there are two types of questions that become intermixed in the nuclear debate. The first are questions of fact, while the second are judgemental in nature. Questions of fact might be: What are the risks of a nuclear accident? What are the risks to public health posed by nuclear energy? Is it economically sound? While judgemental questions which do not give rise to clear cut answers might be: Is the risk of a nuclear accident acceptable in view of the economoic benefits that might be generated? Are potential impacts on future generations ethically defensible?

Virtually no activity that society engages in, is without risk. Questions about nuclear energy are not fundamentally different from those associated with any industrial activity - all involve balancing economic benefits with actual and potential risks to the natural environment, to public health and safety and to future generations.

To illustrate how the perception of risk varies widely among different groups of people, Table 14 shows the actual contribution of 30 sources of risks to the number of annual deaths in the Unites States (determined by actuarial estimates) compared with the respective rankings made by three different groups in response to a survey reported by Scientific American.

It is to be noted that nuclear power, which was rated first by two groups, actually rated 20th as a cause of death.

To put nuclear energy in its proper perspective, it cannot be judged in isolation. It must be assessed in terms of its potential contribution to satisfying

energy requirements relative to other means of achieving the same goal. These include other conventional generating technologies, unconventional alternatives such as solar, wind and biomass, as well as energy conservation.

A study of risk assessment and regulations completed by EMR in 1980 compared the risks of occupational and public fatalities from conventional fuel energy systems, nuclear, coal, oil and natural gas. The findings of this report showed that, in order to fuel a 1000 MWe electric power generating station, nuclear energy was slightly less safe than natural gas but much safer than either coal or oil in terms of occupational and public health risks.

4.6.1 Present Status

The basis of the Canadian nuclear program is the CANDU (Canada Deuterium Uranium) reactor which uses heavy water (deuterium) as both moderator and coolant, and natural uranium as the fuel. It had its first large-scale commercial application in 1971, when the first unit of the Pickering, Ontario, Nuclear Generating Station achieved full power operation.

There are now five operating commercial nuclear stations in Canada, three in Ontario: Pickering "A" (four reactors), Bruce "A" (four reactors), and Douglas Point (one reactor). With a total installed capacity of 5248 MWe, the three stations account for one-third of the province's electrical generation. Gentilly 2 (one reactor) in Quebec and Point Lepreau (one reactor) in New Brunswick are the other two. In terms of lifetime capacity factor, which is the nuclear industry's measure of performance (output over the expected life of the plant), six of the top eight reactors in the world, out of a total of 114 greater than 500 MWe, were CANDU's, and the Bruce Unit 3 was the world leader.

Nuclear stations under construction or committed in Canada, at present, are Pickering "B" (four reactors), Bruce "B" (four reactors) and Darlington (four reactors) in Ontario. As they come on stream between 1983 and 1991, these plants will increase Canada's nuclear power generating capacity to a total of 15127 MWe.

TABLE 14

CAUSES OF DEATH

Actual Ranking

1. Smoking
2. Alcoholic Beverages
3. Motor Vehicles
4. Handguns
5. Electric Power
6. Motorcycles
7. Swimming
8. Surgery
9. X Rays
10. Railroads
11. General Aviation
12. Large Construction
13. Bicycles
14. Hunting
15. Home Appliances
16. Fire Fighting
17. Police Work
18. Contraceptives
19. Commercial Aviation
20. Nuclear Power
21. Mountain Climbing
22. Power Mowers
23. Scholastic Football
24. Skiing
25. Vaccinations
26. Food Coloring
27. Food Preservatives
28. Pesticides
29. Prescription Antibiotics
30. Spray Cans

Perceived Ranking

League of Women Voters	College Students	Business and Professional Club Members
Nuclear Power	Nuclear Power	Handguns
Motor Vehicles	Handguns	Motorcycles
Handguns	Smoking	Motor Vehicles
Smoking	Pesticides	Smoking
Motorcycles	Motor Vehicles	Alcoholic Beverages
Alcoholic Beverages	Motorcycles	Fire Fighting
General Aviation	Alcoholic Beverages	Police Work
Police Work	Police Work	Nuclear Power
Pesticides	Contraceptives	Surgery
Surgery	Fire Fighting	Hunting
Fire Fighting	Surgery	General Aviation
Large Construction	Food Preservatives	Mountain Climbing
Hunting	Spray Cans	Large Construction
Spray Cans	Large Construction	Bicycles
Mountain Climbing	General Aviation	Pesticides
Bicycles	Commercial Aviation	Skiing
Commercial Aviation	X Rays	Swimming
Electric Power	Hunting	Commercial Aviation
Swimming	Electric Power	Electric Power
Contraceptives	Food Coloring	Railroads
Skiing	Prescription Antibiotics	Scholastic Football
X Rays	Mountain Climbing	Contraceptives
Scholastic Football	Railroads	Spray Cans
Railroads	Bicycles	X Rays
Food Preservatives	Skiing	Power Mowers
Food Coloring	Scholastic Football	Prescription Antibiotics
Power Mowers	Home Appliances	Home Appliances
Prescription Antibiotics	Power Mowers	Food Preservatives
Home Appliances	Vaccinations	Vaccinations
Vaccinations	Swimming	Food Coloring

Alternative technologies often cited by the anti-nuclear lobby are not free of environmental impact but are in the foreseeable future only capable of supplying a minute percentage of the energy required. Although the generation of electricity using solar energy appears attractive, proponents should ensure that the public is aware not only of the developmental problems requiring solutions, but of the environmental implication of 50 square miles of collectors that would be required for a 1000 MW generating plant.

The anti-nuclear lobby made much of the supposed effects of a nuclear accident, but the record indicates that no deaths have taken place from an accident associated with any nuclear generating plant. The same cannot be said for any other energy source. No other industry has shown such a preventative approach to pollution and environmental control as has the nuclear industry, and the conclusion must be that nuclear energy is incomparably safer than any other energy source used today.

In view of the emotional appeal of the anti-nuclear lobby, it is difficult to convince the general public and that coal and oil-fired generating plants present a far greater danger to the environment and public health than a nuclear plant. However, the demands for a higher standard of living by most of the world's people will ensure that nuclear generation plays an ever increasing role in supplying their needs.

The International Nuclear Fuel Cycle Evaluation, a major two-year study by 66 nations was released in 1980, and concluded that the contribution of nuclear power to world energy supply will continue to grow into the twenty-first century. The study indicated that the CANDU reactor is generally competitive with light water reactors in terms of economics, safety and environmental impact, and superior to current light water reactors in efficiency of uranium utilization.

4.6.2 The Record

The opponents of nuclear energy have in the past accused supporters as being "non-scientific" and neither objective nor impartial. They further use as an argument that nuclear energy is unsafe and very expensive.

Although it might be possible to conserve energy within the developed nations, the lesser developed nations are insisting, with some justification, for a standard of living at least approaching that of the developed nations. To reach this standard, their use of energy must drastically escalate and the question must be answered "From what source are they to obtain this energy?" Recent international studies have indicated a large role for nuclear energy and natural gas in supplying the global energy needs for the next fifty years.

4.7 TRANSPORTATION

4.7.1 Automobiles

Transportation, consuming over 44 percent of all the oil utilized in Canada, deserves critical examination. As was pointed out in the section of this report under "Oil Use," passenger cars rank as the single greatest contribution to our requirement for imported oil. While substitution for gasoline in automobile use poses more problems than conversions in the non-transportation sector, there is scope for reducing our demand for oil even here.

The average car still on the road is about 6 years old, a gas guzzler, overweight, overpowered, oversized and very thirsty. Newer cars have been downsized by trimming weight and exterior dimensions. Redesign has produced smaller and lighter vehicles with only half of the cylinders of the once universal V-8 engine. Front-wheel drive has eliminated the driveshaft and saved 300 pounds.

Although smaller cars use less petroleum, they are not necessarily more efficient. Of the energy released in combusion, only 12 to 15 percent is finally applied to move the car. Most of the rest is lost due to the basic thermodynamic inefficiency of the engine and escapes as heat. The remainder is drained off by such factors as aerodynamic drag, rolling resistance of tires, transmission slippage, and internal friction.

As the price of petroleum for gasoline and diesel engines converges with that of alternate energy sources, new power systems should become widely available, such as with battery powered cars. Their advantages: quietness, low pollution, and

simplicity. Their disadvantages: cost, limited range, weight and bulk. The development of practical electric vehicles await the development of more efficient batteries.

Although touted by many, power systems that run on compressed gases, such as methane or hydrogen and to a lesser extent propane, are more problematical for the personal car. Range is limited and distribution systems are more complicated than those required for the common fuels of gasoline and diesel fuels. Further, distribution systems are not yet in place.

However, the technology for conversion of automobiles to propane use already exists and the economics are favourable in certain provinces. As a result of government incentives, both federal and provincial, aimed at commercial fleet conversions because of current marketing conditions, several fleets; namely in Ontario and British Columbia, have been converted to propane use. In both provinces as well as Saskatchewan and the Northwest Territories propane has been exempted from road taxes. Although the recent announcement that commerical quantities of natural gas, containing a high proportion of condensates, is available in the Sable Island area, will give Nova Scotia the opportunity to join those provinces who find that propane serves as a viable alternative to imported petroleum products for road use, the Province has not as yet taken steps to do so.

4.7.2 Marine

Next to road transportation, marine use (which is commonly acknowledged to be an efficient and economical manner in which to carry goods) contributes a major share to our requirement for imported oil consumed in the transportation sector. Pioneer work by Japan has produced the "Shin Aitoku Maru" a sail-aided cargo ship. Lacking halyards, sheets, shrouds, and most of the rigging used in the past, the computer trimmed system rotates the mast to provide a fuel saving which has averaged 10 percent since it was introduced in 1980.

4.7.3 Air

Although air transportation accounts for only a small fraction of petroleum usage, it is completely dependent on petroleum fuels and thereby strongly influenced by the availability and cost of these fuels. For long haul trips, there is no other mode that can compare in terms of speed, passenger comfort, and reliability. Until such a substitute can be found, ways must be discussed to improve air tranport's energy efficiency.

The objective is not new. Indeed since the early 70's more efficient aircraft have been added to the airline fleets and an average energy efficiency (measured in seat miles per gallon) of United States airlines have increased by 33 percent. The individually small improvements obtainable from increased load factors, increased seating density, fuel conservation flight measures, and gradual replacement of older aircraft have already been made and only the introducion of modifications and derivatives of current aircraft can provide continuing increases in efficiency.

It has been estimated that new aircraft to come on line by 1990 could be 50 percent more fuel efficient than current models. However, this level of increased efficiency could result only with aircraft utilizing advanced technology including laminar flow control in conjunction with other more conventional modifications.

Considering the characteristics of regional air travel, it is probable that by 1990 the average aircraft in the region could be 30 percent more fuel efficient than at present. This improvement could be achieved from the combined effect of improved airplane materials, aerodynamic improvements, small winglets on the end of the wing to reduce drag and conversion to all economy seating configurations.

The re-development of rigid lighter-than-air (LTA) airships has been suggested as a means of economically transporting relatively bulky goods over considerable distances. Prototypes using helium as the lifting agent, have already been produced in both the United Kingdom and the U.S.A. and series production is planned in the United Kingdom.

4.7.4 Rail

Significant advances in rail technology have occured in recent years in the form of computer applications, computerized and automated yard operations, piggyback operations and containerization. Although Canadian railways have successfully used some to their advantage, few changes have been implemented to suggest the industry is energy conscious. This is likely because any changes in railway technology which give rise to a significant saving in energy are very capital intensive.

Although, as shown under "Oil Use" in this report, rail uses far less energy in total than the other modes of transportation, electrification of railways would conserve significant quantities of petroleum supplies. However, such a program would be so highly capital intensive that the chances of electrification in the near future in the Atlantic region are very remote. More likely, it is believed that practical conservation in the rail mode will be conservative and could consist of rail car and locomotive streamlining. Wind resistance of a train moving at 65 to 110 kilometers per hour consumes from 6 to 20 percent of the horsepower output of a modern, 3,000 horsepower, diesel-electric locomotive. Studies have shown that this wind resistance can be reduced by up to 50 percent by streamlining. Freight-car streamlining and weight reduction could contribute to significant energy savings ranging up to 20 percent on empty car movements.

APPENDIX A

SECTOR RESPONSE

A1 General

With the passage of time since the first of the many drastic price increases of crude oil, experienced by the nations of the world since 1973, energy in all its forms, its costs and its security of supply has become of ever increasing concern to all citizens. Consequently, it was with no surprise that an enthusiastic response was received in reply to questions raised by the Energy Sector.

Meetings held by each sector to explore their energy concerns were attended by a member of the Energy Sector to introduce the topic and answer questions raised as a result of the ensuing discussions.

A2 Common Concerns

It quickly became apparent that a high degree of unanimity existed, indeed to a greater extent than had originally been anticipated. Consequently, the following conclusions were supported by all sectors.

a. Conservation

An aggressive pursuit of conservation as the cleanest and least cost way to reduce dependence on imported oil is unanimously supported.

b. Maritime Energy Corporation

The formation of an effective Maritime Energy Corporation to provide economical electrical energy on a regional basis is strongly supported.

c. Cost-Benefit Analysis

A cost-benefit analysis of all energy sources for electrical generation, including nuclear, should be made readily available to the public.

d. Electrical Generation

The selection of fuels utilized as sources of electrical energy should be based on their cost effectiveness in providing the least cost energy to Nova Scotians.

e. Conversion if Environmentally Acceptable

The conversion of oil-fired thermal generation plants to coal is not supported since available reports indicate that as a general rule, they are unlikely to be economically justified.

SPECIFIC SECTOR CONCERNS

A3 Agriculture

The Agricultural Sector, in common with other sectors of the economy, is primarily concerned with the cost and security of supply of energy sources. The predicted increase in oil costs will result in a corresponding increase in production costs which must be passed to the consumer if farm bankruptcies are to be avoided.

The greatest effect of increased oil costs will be on operations such as greenhouses and broilers where a large percentage of total energy cost is attributable to primary usage.

The supply of natural gas will have little effect directly to the farm since it will not be provided to most rural areas.

Since it is the stated aim of the Federal Government to reduce the supply of heavy fuel oils, alternative sources will have to be developed to meet the energy needs of the farm. The increased use of electricity would seem to be the most likely result, and if this is the only alternative available, it should be subsidized for farm use.

In addition to the increased use of electricity, the possibilities of the use of biomass and methane on the farm require study and if suitable, financial assistance to convert should be offered.

The Agriculture Sector is of the opinion that oil is not yet expensive or scarce enought to stimulate the major research and development effort required to provide true alternatives.

A4 Construction

The Construction Sector, as a service industry, must pass on to the consumer the increased costs due to rising fuel prices. Since most construction equipment will remain dependent on petroleum fuels for the foreseeable future, the industry will remain "locked into" this rising cost and competitive advantage must result from greater efficiencies in administration, servicing and in the more effective utilization of equipment.

The supply of natural gas to the province will have no appreciable impact on construction costs; however, it will lead to flurry of activity in the retrofit of existing oil equipment and will create employment for mechanical trades.

The Sector believes the only practical alternative to oil heating in this region at the present time is electricity. The effect of disqualification of electricity conversion for federal financial assistance will have only secondary implications for the institutional and commercial market, however, the implementation of comprehensive retrofit programs for existing public buildings is of more practical concern to the industry.

The Construction Sector is of the opinion that energy conscious design and construction of new buildings can reduce energy consumption by 75 percent or more compared to old stock with similar savings possible by rebuilding old stock. A 30 to 60 percent saving is realizable by retrofitting existing buildings, particularly if incentives such as tax exemptions on conservation equipment, tax system recognition of such expenditures and exclusion of such measures from property tax, are instituted.

The Sector believes Nova Scotia should have access to New Brunswick nuclear power; but the options of coal resource development, natural gas delivery systems and the prospects of offshore oil and gas are of more immediate concern.

The Sector is of the opinion that coal-fired generation is practicable considering the immense reserves yet to be tapped in the province. The Sector supports coal-fired generation for commercial, institutional and industrial use.

The Sector recommends that the Province adopt the National Building Code and "Measures for Energy Conservation in Buildings" as a step in showing leadership in the design and construction of energy efficient buildings.

A5 Fisheries

The rising costs of oil is of particular concern to the operators of fishing vessels, since this segment is energy intensive and coupled with the current economic crises in the industry, the impact could be critical.

The market prices of the products have not increased in proportion to operating costs resulting in shrinking margin of profit for vessel operators.

The following examples indicate that if the cost of fuel and lubricants double relative to 1980 values, while other prices and cost factors remain constant, the resulting effects on a few types of vessels:

	IF COST OF FUEL DOUBLES, THEN:	
	FUEL AS % OF LANDED VALUE, GOES FROM:	TOTAL CASH EXPENSES INCREASE BY ABOUT
54' Dragger	11.2 to 22.4 %	31%
55' Danish Seiners	6.6 to 13.2	25
34' Multipurpose	4.9 to 9.8	21
65' Herring Seiner	2.9 to 5.8	8
100' Scallop Dragger	8.9 to 17.8	22

The 155 ft. class of groundfish sterntrawlers were not included in this Costs and Earnings study. From data received on one such vessel in 1980, fuel costs were in the order of 20 percent of the landed value. This is based on "offshore fish prices" averaging 13.7¢/lb. With "inshore prices" of say 20¢/lb., this percentage would decrease to about 14 percent.

Although crude oil prices are significantly less than world oil prices, government taxes are causing diesel fuel oil prices to raise to near world oil prices more quickly than most tables imply:

EXAMPLE: $CND/Gallon (June, 1981)

Canada	$1.29 - 1.36
U.S.	1.58
U.K.	1.72
Japan	1.79
Norway	1.76

It is noted that numerous foreign governments highly subsidize fuel costs for their fishing fleets (i.e. Norway, France).

Volume buyers in other countries (large ships bunkering in foreign ports) do not incur significantly higher prices than local prices for diesel fuel (government taxes and distribution costs included).

Of more impact to fish processors is the cost of electricity since a frozen product requiring extensive cold storage facilities is produced. For this reason, also, the supply of natural gas would have less impact since it would be utilized mainly in providing heat. However, if natural gas was used in power generating plants to lower electricity costs, its impact would be profound. If electricity costs would be lowered, the study of the nuclear option would be supported as would any energy mix that would provide this result.

A6 Forestry

The Forestry Sector is of the opinion that the industry cannot contribute significantly to the further generation of energy, since hardwood is now at approximately 2/3 of its allowable cut, without silvicultural input.

The total annual use of hardwood is estimated between 450,000 to 460,000 cords partially made up as follows:

Scott Paper	- 100,000 cords
Masonite of Canada	- 75,000 cords
Fuel Wood	- 200,000 cords
NSFI	- 30,000 cords
Lumber & Mine Packs	- 12,000 cords

As Canada approaches the world price for oil, its present competitive advantage will narrow, but since transportation costs contribute less to product price in Nova Scotia than in other Canadian provinces the competitive advantage of Nova Scotia producers versus other Canadian producers should improve. Smaller firms compelled to use oil for generating electricity will experience increased costs and realize a lower competitive advantage than the larger more efficient industries.

It is considered that the 10 percent cost advantage of gas over oil as detailed in the National Energy Program will be insufficient to justify conversion and a grant covering the total conversion costs to natural gas will be mandatory to ensure its acceptance. Further, it will be essential to monitor conversion costs to keep pace with inflation.

The Sector is of the opinion that the long term oil supply is not as critical as it formerly seemed to be, and that coal will not replace oil or natural gas in electrical generation unless heavily subsidized.

The Sector sees no alternative to higher oil costs than to increase our use of electrical energy. Consequently, the study of nuclear energy as a power source is supported.

The Sector believes that existing oil-fired generating plants should not be converted to coal. Members are of the opinion that even though coal must be significantly cheaper than either gas or oil to offset environmental problems, diversification requires its use to some degree. For the same reason the use of biomass waste is supported and is now being utilized as follows:

- 60,000 tons purchased by Scott Paper
- 40,000 tons purchased by Bowater Mersey
- 35,000 tons purchased by Gordon's Greenhouse Ltd.

More biomass could be made available as a result of more intensive forest management practices.

A7 Manufacturing

The Manufacturing Sector believes that the following are critical concerns that must be addressed if product manufacturing and resulting manufacturing employment is to flourish in Nova Scotia:

a. The priority concern of manufacturers is a secure supply of energy at the lowest possible cost. It is generally believed that former studies carried out as part of the Development Strategy, which concluded that energy costs formed no more than 5 percent of total production costs, are now likely in error and that present energy costs form a much higher proportion. As a result, the increase in the cost of energy must be held to the minimum possible if Nova Scotia hopes to retain its existing manufacturing base and to attract industries in the future.

b. The assumption of the provincial government as indicated in "An Energy Plan for Nova Scotia" that the province should be self-sufficient in electrical generation is not supported carte blanche. The Manufacturing Sector unanimously supports purchasing power if it is cheaper than can be generated within the Province.

c. The completion, by the earliest possible date, of the natural gas pipeline to Nova Scotia is strongly supported both for reasons of security and in view of its lower guaranteed price with respect to oil. This lower price will provide an alternative source of energy at a competitive price advantage to those manufacturers who are located within the natural gas service area. However, those firms situated outside this service area will face an additional competitive disadvantage to those who are able to convert.

d. The Manufacturing Sector strongly supports the formation of a Maritime Energy Corporation (MEC), which would carry out regional planning of the generation and transmission of electrical power within the Maritime Provinces to achieve the highest efficiency and lowest cost possible in the supply of electrical energy.

The Manufacturing Sector offered the following specific recommendations:

a. Decisions made with respect to the future supply of energy must be based on its provision at the lowest possible cost.

b. The decision made by the province in its "Energy Plan for Nova Scotia" to embark on a maximum coal option for the generation of electrical energy is not supported by the Manufacturing Sector, since no hard evidence was provided to show that coal is the most cost efficient choice. Previous studies carried out by the Energy Sector in 1981, indicated that sufficient coal could be made available to meet our requirements if some metallurgical grade coal was used for thermal purposes. However, as was the case when the previous energy study was reviewed, hard information on coal is still not available. Before the Manufacturing Sector could support a coal policy, the true cost breakdown of each of the alternatives including coal, nuclear, natural gas and purchased power would have to be known. Those costs would include all direct costs as well as all subsidies, grants, etc.

c. The energy mix suggested by the Energy Sector, namely:

1. the conversion of some oil-fired plants to coal;
2. increased use of hydro power from Quebec; and
3. the regional use of nuclear power from Point Lepreau, is only supported if:

   a. the priorized alternatives are ranked on a basis of their cost effectiveness in providing the least cost energy to Nova Scotians and that the analyses of the cost effectiveness is determined without the impact of special programs, grants, subsidies, and other arrangements, involving Federal financing.

   b. the alternatives all have equal credentials in terms of:
      1. supply security;
      2. future pricing to the consumer as the result of operating costs;
      3. distribution; and
      4. environmental risk.

   c. The nuclear alternative should be explored in all aspects: economic, social and environmental and should include the possibility of sharing a portion of the output of Point Lepreau.

   d. The proposed natural gas distribution system, within the province, should be expanded to include both Bridgewater and Liverpool on the South Shore and as far as Bridgetown in the Valley, as it is believed that the requirements of local industries are such as to support the increased distribution costs.

   e. The speed at which the province is attempting to reduce its dependence on oil has been questioned since recent price reductions of this commodity make it more likely that some suggested alternatives could cost even more.

A8 Tourism

The Tourism Sector sees the fact that Canadian oil is still below the world price as giving Nova Scotia tourist operators a major advantage over European tour operators.

The proposal that natural gas be made available in Nova Scotia will aid the tourist industry in keeping costs down in areas where it is available; however, it will be detrimental to those operators situated in rural areas not served by natural gas.

In an attempt to obtain more economical electrical power, the option of nuclear power should be given serious study including possible effects on tourism.

As an incentive to encourage conversion to propane for transportation uses, the sector supports the removal of sales taxes on buses powered by fuels other than gasoline or diesel.

Although the sector supports an energy mix for electrical generation, its acceptance of coal is based on coal-fired plants being environmentally acceptable.

APPENDIX B

BTU EQUIVALENTS OF COMMON FUELS

Fuel	Unit	Conversion Factor BTU x 10^6	Conversion Factor Joules x 10^9
Canadian Bituminious Coal	short tons (2000 lbs.)	25.2	26.58
Crude Oil	barrel (35 imp gals)	5.8	6.12
Natural Gas	10^3 cuft	1	1.0548
Electricity	10^3 Kwhr	3.4120	3.598

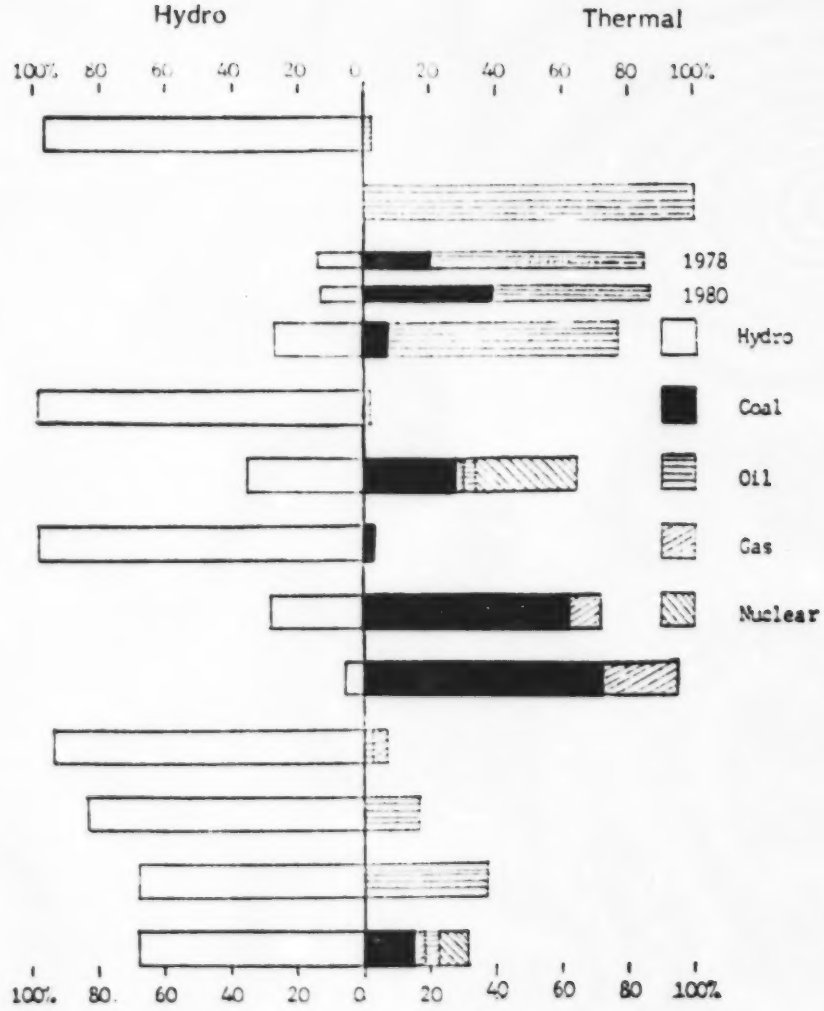
@ 1 BTU = 1.0548 kilo joules

Conversion Factors

Metric Unit	Equivalent
1 cubic metre (m^3) oil	220 imp. gallons/6.293 barrels
1 cubic metre (m^3) (natural gas)	35.30 cubic feet
1 metric tonne (t)	1.10 short tons
	0.98 long tons
1 Joule	0.948 x 10^{-3} BTU's

Prefix	Symbol	Value	Common Expression
kilo	K	10^3	thousand
mega	M	10^6	million
giga	G	10^9	billion
tera	T	10^{12}	trillion
peta	P	10^{15}	quadrillion
exa	E	10^{18}	quintrillion

Total Production GWh	
46258	Newfoundland
127	Prince Edward Island
6863	Nova Scotia
9293	New Brunswick
97807	Quebec
110125	Ontario
19462	Manitoba
9188	Saskatchewan
23391	Alberta
43334	British Columbia
384	Yukon
455	Northwest Territories
366677	Canada



Electrical Generation by fuel type - 1980

APPENDIX D

NSPC GENERATION

EXPANSION PLAN

(Net GWH)

Year	Hydro	Purchased	Oil/Gas	Coal	Total
1982	982	263	2101	3350	6696
1983	982	263	2263	3434	6942
1984	982	263	2304	3666	7215
1985	982	263	1745	4506	7496
1986	982	263	934	5595	7774
1987	982	263	236	6565	8046
1988	982	263	127	6952	8324
1989	982	263	177	7186	8608
1990	982	263	235	7419	8399
1991	982	263	318	7624	9187
1992	982	263	320	7940	9505
1993	982	263	198	8416	9859
1994	982	263	247	8692	10184
1995	982	263	263	9019	10527

Submission to NEB by Province of Nova Scotia, December, 1980.

APPENDIX E

NSPC INSTALLED CAPACITY

Fuel	Location	Gross Generating Capacity MW
Hydro	Various	355
#2 Fuel Oil	Burnside	97
(Gas Turbines)	Tusket	23
	Victoria Junction	60
Bunker C	Point Tupper	231
	Tufts Cove	350
	Water Street	165
Coal	Glace Bay	96
	Maccan	15
	Trenton	210
	Lingan 1 & 2	300
Wind Turbine	Wreck Cove	.280
		1902.28
Coal	Under Construction Lingan 3 & 4	300
		2202.28

Lingan 3 - Lingan 4
completion 1984

APPENDIX F

VOLUNTARY PLANNING
A Review of "Energy - A Plan for Nova Scotia"

BACKGROUND

The dependency of Nova Scotia on foreign oil for over 80 percent of its total energy demand with its escalating cost and insecurity of supply resulting from scarcity and political instability in many of the producing countries, has created an urgent need for Nova Scotia to develop a long term energy plan.

An initial Energy Plan for Nova Scotia has been produced which in effect, is a summary of the reports prepared by eight Task Forces evaluated and directed by an Energy Planning Board with overall responsibility assumed by the Energy Planning Organization within the Department of Mines and Energy.

GENERAL

Following a presentation made to the Energy Sector on the Energy Plan in November, 1979, by the Deputy Minister of Mines and Energy, the Sector was requested in May, 1980, to review and comment on the completed version of "An Energy Plan for Nova Scotia."

In order that a review could be completed by the earliest possible date, the Chairman of the Energy Sector assigned various chapters of the Plan to individual members who reported their findings to a general sector meeting. Their conclusions and comments form the basis of the following discussion.

DISCUSSION

The Plan gives an excellent appraisal of our critical dependence on imported oil and indicates that our efforts to obtain alternate fuel sources such as natural gas must be supported by the federal government.

While the paper makes the point that Canadians are the highest per capita consumers of energy in the world and that 44 percent of this energy is supplied from oil, it does not stress the most important fact that Canada's energy problem is mainly one of distribution. This is particularly true of the irrational attitude that is maintained with respect to the transmission of electric power across provincial boundaries.

The "Energy Plan" correctly points out the importance of conservation in reducing our dependence on foreign oil, but it is noted by the sector that there are many institutional impediments to its application. In this regard, the fact that the National Building Codes Act has not yet been proclaimed must be deplored.

The projections for energy demand do not take into account any substantial increases in the requirements of manufacturing industries in Nova Scotia. The projected annual growth rate of 1 percent in our industrial energy requirement cannot meet the requirement to create increased manufacturing employment which is seen as necessary by the Green Paper, "Toward an Economic Development Strategy."

In general, the Energy Plan is a supply oriented document which advocates the use of coal in replacing oil in electrical generation without the benefit of the cost/benefit analyses of the major energy options as previously recommended by Voluntary Planning in its report "Energy Outlook 1990." The use of coal for other uses such as replacing petroleum in transportation applications, as is done in South Africa, is not really addressed, nor is the substitution of one form of energy for another given much consideration. For example, the introduction of the electric car could result in a major decrease in demand for petroleum products and a corresponding increase in demand for electricity and a similar substitution could take place in home heating.

Most noticeably, although the document discusses in some detail various alternative energy sources such as geothermal, biomass, solar and wind it does not discuss the nuclear option and therefore cannot be considered to be a complete energy study.

With the exception of the use of a small amount of natural gas and propane for heating purposes, the replacement of imported oil is proposed to take place entirely in the field of electrical generation, which is thoroughly covered by the Plan. The conclusion that a balanced mix of generation and purchased power with strong electrical interconnections offers the best prospect for a stable and least cost supply of electrical energy to the province is strongly supported.

To meet the projected demand for electrical energy, reliance is placed by the Plan on the supply of thermal coal from Nova Scotia sources. If the assumptions made for the supply and demand for thermal coal are accepted, the results presented in Chapter VI of the Plan cannot be faulted. However, there is little detail regarding underground mines 1, 2, 3, or 4 as well as new surface mines 2 and 3 and more updated information from the supply view is required before the Sector can accept the results. Consequently, the conclusion that thermal coal can be provided to meet the requirement is viewed with scepticism.

The treatment of natural gas as part of the Energy Plan is rather sketchily done. There is inconsistency in the suggestion that Western Canada has enough gas to supply an expanding Canadian market, but if offshore gas is discovered in commercial quantities, that there will be a ready market for it in the region now supplied by Western gas. Further, no economic or costing data has been included with respect to the pipeline. Some concern was expressed that the strong endorsement given to a gas pipeline may not be consistent with a strong coal base for electrical generation or the prospects for Sable Island. However, to reduce the use of imported oil in electric power generation, natural gas would seem to offer the only viable option until increased quantities of thermal coal became available in the late 80's when the use of natural gas in thermal generating plants should drop to zero. Therefore, in spite of the unknown subsidization of natural gas that will be required, it is the opinion of the Sector it will be better to subsidize Canadian natural gas in lieu of imported oil.

River hydro generation is capable of producing only a very small percentage (less than 1 percent) of total electrical generation and consequently deserves only a low priority.

Tidal power is adequately covered by the Plan and even though the first phase, the development of a pilot project at Annapolis has commenced, tidal power can make no real contribution to the Nova Scotia energy requirement until the mid 1990's.

In an emergency, the Sector cannot find any reassurance that more than 10 percent of Nova Scotia's energy requirements for oil can rationally be met by substitution of alternative energy sources. Even assuming that oil can be made available from Western Canada sources, the means by which it could be transported to the Maritimes is by no means certain, and there is some evidence to indicate the tankerage in the medium 40-80 thousand dead weight ton class would not be available to respond to a crude oil shortfall.

In view of Canada's commitment to achieve political resolution with respect to emission control across the border, it seems imperative that acknowledgement of the potential consequences of implementing energy options be considered. This has not been done. Nor has it been recognized that the relatively high sulphur content of Nova Scotian coal will create an emission source of pollution, although discharging largely offshore, will provide additional burdens on Newfoundland.

The very large public and private research effort being focused on the production of low cost photovoltaics in the United States will likely result in a larger impact on the provision of energy than is indicated in the "Energy Plan."

CONCLUSIONS

Canada's energy problem is mainly one of distribution and the interprovincial distribution of electricity should be viewed by the National Energy Board in the same manner as it views the distribution of oil and gas interprovincially, i.e. to permit the free movement of electricity across provincial boundaries. The consequence of such actions would probably be the development of a strong Canadian electrical grid. In this regard the recommendation of the sector, made in its report, "Energy Outlook 1990", that priority should be given to establishing a working regional energy corporation and a strong regional electrical grid is still valid and urgent.

The Energy Plan does not make clear that only 21 percent of the imported petroleum used in the province is utilized for electrical generation while approximately 43 and 36 percent respectively are utilized by the transportation and residential/industrial sectors. Except for conservation plus the substitution of Canadian natural gas for imported oil, no plan of reducing the use of oil in the latter two sectors is offered.

The Plan reduces simply to a justification for the substitution of imported oil by coal in electrical power generation. Since the Plan requires a supply of natural gas to meet the shortfall until sufficient coal can be made available and the National Energy Board has refused to extend the gas pipeline from Ouebec, an increase in the use of imported oil is foreseen.

In view of lack of detail given regarding undergound mines, numbers 1, 2, 3, and 4 as well as near surface numbers 2 and 3, the sector is skeptical that sufficient amounts of thermal coal can be made available from Nova Scotia sources to meet the demand for electrical power generation wit[illegible]sorting to the use of metalurgical coal.

It is considered that the rates of growth in the use of energy as projected by the Plan do not allow for the growth in manufacturing that will be required to meet the need for increased employment as enunciated by the Green Paper, "Toward a Development Strategy", which was recently released.

It is realized that to ensure market penetration in the Maritimes, Western natural gas must be subsidized, the cost of which is not yet clear. However, the sector believes that it will be to the advantage of Canada to subsidize our own natural gas in lieu of foreign oil.

The Energy Plan should acknowledge environmental problems and include contingency solutions for their rectification.

It was felt that the formation of an Energy Task Force whose mandate would be to work with industry to support their conversion to alternate energy sources would

serve a useful purpose. Such a Task Force if funded by both federal and provincial governments could, for example, assist industries such as Masonite of Canada to convert to a wood fired turbine and steam generation system using sawmill residue presently being discarded as waste.

To keep Nova Scotia from "freezing in the dark," secure redistribution plans for the allocation of oil in an emergency must be put into effect as soon as possible. As an initial step towards securing an emergency supply, arrangements should be made for additional oil storage within the province.